DEPARTMENT OF COMMERCE PUBLICATION

Commercial Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

DECEMBER 1971

VOLUME 24
NUMBER 12

Seattle, Wash.

UNITED STATES DEPARTMENT OF COMMERCE
Maurice H. Stans, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Robert M. White, *Administrator*

NATIONAL MARINE FISHERIES SERVICE
Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.36 FAT CELL SIZE AND LIPID METABOLISM
(0.4)(0.7)

Anonymous
Nutrition Reviews 29, No. 8, 188-190 (August 1971)

Using subcutaneous adipose tissue obtained from 33 patients undergoing laparotomies, Smith (J. Lipid Res. 12, 65, 1971) isolated the adipocytes and, assuming the cells were spherical, calculated cellular volume, cell weight, and cell number. Cell diameters ranged from 38 to 140 μ; the mean was 94 μ. Large cells (87 μ) incorporated more glucose into the total lipids per 1,000 cells than the small cells (68 μ) did; however, glucose conversion to lipid was stimulated by insulin more in the small cells (57%) than in the large cells (43%).

Using the fat cells isolated from the epididymal fat pads of male rats, Zinder and Shapiro (ibid., p. 91) determined the influence of epinephrine and adrenocorticotrophic hormone (ACTH) on the release of free fatty acid (FFA) from adipocytes. The mean diameter of the cells they measured ranged from 30 to 90 μ, roughly proportional to the weight of the rat. When they used a centrifugation technique to obtain cell populations of different size, FFA release correlated positively when plotted against cell radius; negatively when calculated per μmole of triglyceride, or cell volume; and somewhat less negatively or not at all when calculated per square centimeter of cell surface area. The conclusion is that FFA release stimulated by either of these hormones is a function of cell surface area--a function of both size and number.

Both of these studies indicate that when lipogenesis and lipolysis are calculated per unit cell, these metabolic functions increase directly with cell size.

(over)

0.38 INVESTIGATIONS ON ENZYMES IN FISH. I. ENZYME-ACTIVITY
(9.13) IN DEPENDENCE OF pH, TEMPERATURE AND WATER COMPOSITION

Reichenbach-Klinke, H.-H. (Zool. -Parasitolog. Inst. der Univ. München, Germany)
Arch. FischWiss. 20, No. 2/3, 169-177 (1969) (In German)
Sport Fishery Abstracts 16, No. 2, Abstract No. 13439, 183 (1971)

The enzymatic activity has been determined for trypsin, chymotryspin and α-amylase of rainbow trout (Salmo gairdneri Rich.) and whitefish (Coregonus lavaretus L.) on 125 specimens. The pH value ranges from 2.8-5.8 in healthy stomachs of rainbow trout; in trout with viral hemorrhagic septicemia - from 6-9. The enzymes measured are temperature dependent. Trypsin and chymotrypsin showed an optimum for trout and whitefish at 25° C; amylase at 26-28°C for trout, 25°C for whitefish. Different water pollutants - phenol, detergents (Marlon A) and medications - cupravit, malachite green - inhibit the enzymatic action. (Auth. summ.) Reprinted

---

0.38 COMPARISON OF THE AMINO TERMINAL SEQUENCES OF BOVINE,
(1.71)(1.92) DOGFISH, AND LUNGFISH TRYPSINOGENS
(0.322)

Hermodson, Mark A., Ross W. Tye, Gerald R. Reeck, Hans Neurath, and Kenneth A.
Walsh (Dep. Biochem., Univ. Washington, Seattle, Wash.)
Chemical Abstracts 75, No. 5, 30171x (August 2, 1971)

0.38 SENSITIVITY OF FISH ATPASES TO POLYCHLORINATED BIPHENYLS
(9.19)

Yap, H. H., D. Desaiah, and L. K. Cutkomp (Department of Entomology, Fisheries and Wildlife, University of Minnesota, St. Paul, Minn.) and R. B. Koch (Honeywell Research Center, Hopkins, Minn. 55343)
Nature 233, No. 5314, 61-62 (September 3, 1971)

Because the ATPase enzyme system of blue gill fish (Lepomis machrochirus) is sensitive to DDT and related compounds, and because the effects of cyclodiene-type chlorinated hydrocarbons are distinctly different, the authors examined the effect of three polychlorinated biphenyls (Aroclor 1221, Aroclor 1254, and Aroclor 1268) and one polyclorinated terphenyl (Aroclor 5460) on the ATPase activities of this fish. The last two digits in the word-number trade name of each of these compounds indicates its percentage of chlorination.

Tissues were dissected, homogenized, and fractionated, and the fractions containing mitochondria and nerve endings were treated with various concentrations of the polychlorinated hydrocarbon compounds. ATPase activities were determined by the method of Yap et al., 1970; proteins, by the method of Lowry et al., 1951. As can be seen by the results tabulated on the back of the card, all the compounds inhibited ATPases in concentrations of less than 1 p.p.m. The Mg^{2+} ATPase of muscle was inhibited most pronouncedly. This enzyme's high sensitivity to these polychlorinated hydrocarbons coincides with its high sensitivity to DDT. As a rule, the percentage chlorination of a compound was unrelated to its inhibitory effect.

(over)

0.4 FOOD AND SAFETY
(9.6)

Craddock, V. M. (reviewer)
Metabolic Aspects of Food Safety
Francis Roe (editor)
Published by Blackwell: Oxford and Edinburgh, xxiii + 612 pp. (1970) £7
Nature 232, No. 5312, 586 (August 20, 1971)

This collection of 20 articles considers the tests used to assess the safety of food additives and contaminants and the problems that arise in the researcher's attempts to interpret the results the tests give. For example, the basic physiology of the small intestine and of gastrointestinal absorption in animals and in man, the gut flora, age, sex, hormones, and nutritional status of the experimental animal are all significant; and the fact that protein deficiency makes animals less sensitive to compounds such as heptachlor (which exert their toxic effects after metabolism) and more sensitive to those such as aflatoxin (the toxicity of which probably does not depend on metabolic conversion) shows how difficult it is to apply test results to both undernourished and affluent societies.

The reviewer suggests that substitution of discussions on possible hazards to the brain of methylmercury contamination, say, and of dyes, fungal metabolites, and other possible food contaminants that are known teratogens for some of the standard textbook material that was included would have made the book more valuable.

LB

0.38 (9.19)

Tissue source	Conc. of Aroclor	Inhibition by Aroclor (in percent) 1221 Mg^{2+}	1221 Na^+-K^+	1254 Mg^{2+}	1254 Na^+-K^+	1268 Mg^{2+}	1268 Na^+-K^+	5460 Mg^{2+}	5460 Na^+-K^+
Brain	0.03	0.3	4.6	4.2	16.9	0.4	29.4	2.3	26.9
	0.33	8.4	10.5	0.7	19.1	+1.5	27.6	2.9	26.3
	3.33	7.2	20.4	27.7	41.5	14.0	43.6	2.5	38.9
	10.00	36.0	46.4	57.9	45.5	8.3	39.4	11.2	42.7
Kidney	0.33	7.4	15.1	1.3	35.2	0.0	25.4	0.0	22.3
	3.33	5.0	24.3	33.4	45.9	+7.9	40.1	4.5	25.2
	10.00	42.8	43.3	60.1	51.7	+4.8	48.0	+1.4	33.8
Liver	0.03	2.2		3.9		--		--	
	0.33	2.6		19.4		+5.3		6.6	
	3.33	2.9		24.3		+5.1		9.3	
	10.00	35.8		53.0		+2.4		15.8	
	16.70	45.9		74.1		6.2		--	
Muscle	0.03	18.7		20.6		37.2		31.9	
	0.33	29.9		30.6		47.1		42.9	
	3.33	65.4		73.1		60.3		--	
	10.00	80.4		84.3		67.5		--	

Each value represents the mean from three separate preparations.
Plus values represent percentage activation of enzymatic activity.
The specific activity (in µmol Pi mg^{-1} protein h^{-1}; mean ±s.e.) for Mg^{2+} ATPase and Na^+-K^+ ATPase, respectively, from untreated tissues of brain was 25.2 (±1.0) and 35.8 (±2.1); kidney, 31.3 (±1.3) and 42.0 (±0.7); liver, 28.5 (±3.0) and 2.8 (±0.8); and muscle, 57.1 (±2.2) and 2.3 (±0.8). Low activities for the last two enzyme systems hampered determinations of inhibition.
[2 tables, 22 references]

LB

0.36 (0.4)(0.7)

Since this increase is attributable to cell surface area, the product of lipolysis per unit mass will decrease as the adipose tissue mass increases (because of the decrease in surface area relative to total mass as cell size increases). New membrane in young, actively growing animals may be synthesized as fat cells become more numerous and as they expand to take up more lipid; but in older animals such synthesis may be so limited that further expansion requires stretching of the existing membrane, with no new receptor sites added. Thus the long-standing hypothesis that lipolytic hormones act on receptor sites of the plasma membrane of the cell is accommodated. Also, the contradictory results reported by Knittle and Hirsch in 1968 can be explained by the fact that they used larger cells from older animals in their experiments.

These data are evidently important to an understanding of obesity and weight control. If the processes of lipolysis and lipogenesis are related only to cell number and to a fixed surface area of receptor sites, the regulation of lipogenesis will depend entirely on hormonal stimulation and substrate availability. On the other hand, if it is related to cell size and, more specifically, to surface area, FFA release and glucose incorporation will be governed by prior lipogenesis and the consequent cell enlargement--that is, the tendency to obesity will be related as much to prior expansion of adipose cells, conditioned by dietary factors, as it is to the number of these cells. Moreover, if the effectiveness of insulin stimulation of lipogenesis decreases as cell size increases, some regulatory mechanism based on cell size could control the expansion of adipose tissue. Thus the constitutionally obese person might simply have a large number of genetically conditioned adipose cells. Or the rate of lipid storage in his adipocytes could be influenced by the diet-conditioned increase in his cell numbers when he was young or by his cell size when he was either young or old.

LB

0.5 (2.05)(9.19)

STUDIES ON THE INTERDEPENDENCE OF THE SELECTED PSYCHROPHYLIC BACTERIA STRAINS AND THEIR ACTIVITY ON SALMONELLA AND ESCHERICHIA GROUPS

Zaleski, Stanisław, Patricio Garcia-Tello, and Eugeniusz Rozmysł (Department of Fish Microbiology, Wyższa Szkoła Rolnicza, Szczecin, ul. Kazimierza Królewicza 4, Poland)
Zeszyty Naukowe 31, Acta Ichthyologica et Piscatoria I, 117-126 (1970)

The interactivity of microbes--that is, the inhibition or stimulation of one species on the growth of another--plays an important part in the quantitative formation of the microbes and in the specific formation of bacterial populations under natural conditions. Although several researchers have proved the bacteriostatic or stimulatory capability of a number of bacterial strains, little work has been done on the interactivity of water and land species. The present work was undertaken to determine whether certain psychrophilic marine bacteria have a bacteriostatic effect on two microbial groups of land origin--Salmonella and Escherichia. If so, these marine bacteria could cause the two terrestrial pathogens to lose their pathogenic character and, by eliminating species of microbes pathogenic to humans and animals, play an important part in the self-cleaning of coastal waters (where contamination by Salmonella intestinal rods is most prevalent).

In 91.9% of the 841 combinations investigated, the Salmonella strains resisted the activity of the psychrophilic forms. Thus, the authors conclude, antagonism between these strains and those of marine origin has little effect on the self-cleaning of waters. The most sensitive species to the activity of the psychrophilic microbes was Flavobacterium; the least sensitive were Pseudomonas and Aeromonas. Escherichia resisted the stimulatory activity of the psychrophiles.
[4 tables, 9 references]

LB

0.38 (9.13)

INVESTIGATIONS ON ENZYMES IN FISH. II. TRYPSIN- AND α-AMYLASE INHIBITORS

Reichenbach, Klinke, H.-H., and K.-E Reichenbach-Klinke (Zool. -Parasitol. Inst. und dem Inst. für klinische Chemie und klinische Biochemie der Univ. München, Germany)
Arch. FischWiss. 21, No. 1, 67 (1970) (In German)
Sport Fishery Abstracts 16, No. 2, Abstract No. 13441, 183 (1971)

The inhibitory effect of tapeworms and organ extracts on the intestinal enzymes of fish has been studied. Living tapeworms of the species Proteocephalus longicollis (Zeder) inactivated trypsin amounts up to 200 mµ per g of intestine; with extracts of macerated worms the effect was 10-30% higher. α-amylase is inactivated by worm extracts up to 48 SE. The inhibitory effect of organs of freshwater and marine fishes on trypsin was determined. It was especially high in liver and skin, and increased in diseased animals. (Authors' summary) Reprinted

---

0.38 THE ZYMOGEN OF TADPOLE COLLAGENASE

Harper, Elvin (Developmental Biology Laboratory and the Arthritis and Clinical Immunology Units of the Medical Services, Massachusetts General Hospital and the Departments of Medicine and Biological Chemistry, Harvard Medical School, Boston, Mass.), Kurt J. Bloch, and Jerome Gross
Biochemistry 10, No. 16, 3035-3041 (August 3, 1971)

This paper describes the detection, partial characterization, and activation of the zymogen in extracts of tadpole tail fin.
[9 figures, 3 tables, 40 references]

FTP

0.5 THE EFFECT OF OXYGEN ON THE GERMINATION AND OUTGROWTH OF SPORES OF CLOSTRIDIUM BUTYRICUM

Hambleton, R., and G. J. Rigby (Department of Pharmacy, University of Manchester, England)
Journal of Applied Bacteriology 33, No. 4, 674-678 (December 1970)

Quantitative data demonstrate that the germination, outgrowth, and colony-forming ability of Clostridium butyricum will decrease as the concentration of oxygen in the incubation atmosphere is increased (from 0.1 to 10.0% (v/v)).
[1 figure, 2 tables, 10 references] LB

Various media were investigated for their suitability for use in the differentiation of pseumonads. A system was postulated by which pseudomonads isolated from meat, fish and milk may be differentiated. C.S.B. Reprinted

Kielwein, G.
Arch. Lebensmittelhyg. 22, No. 2, 29-37 (1971) (In German)
BFMIRA Abstracts 24, No. 6, Abstract No. 1622, 339 (June 1971)

0.5 THE ISOLATION AND DIFFERENTIATION OF PSEUDOMONADS FROM FOODS

0.6 POLYPHOSPHATE TREATMENT OF FISH
(0.37)(3.12)
(3.230)

Gordon, A. (Technical Information Service)
Food Manufacture 46, No. 7, 57-58 (July 1971)

Fresh fish are about 80% water, most of which is chemically bound to the muscle. Normally between 10 and 15% of the free water is pressed out during processing, impairing the quality of the fish, since exudation causes reduction of such nutritional constituents as protein, mineral salts, and vitamins. Application of phosphate to the fish product presumably modifies the surface layer of the protein and prevents the escape of fluid from the interior of the muscle. The resulting product is less likely than are untreated products to lose flavor, texture, color, juiciness, and freshness. Fish sticks and portions, shellfish, and delicatessen fish products also benefit by the application of phosphate. This article reviews the work done over the past several years on various polyphosphate solutions and their method of application to fish products.
[7 references] LB

Hobbs, Geoffrey, and Roy Hardy (Torry Res. Stn., Minist. Technol., Aberdeen, Scotland)
Chemical Abstracts 74, No. 25, 139584q (June 21, 1971)

0.6 FISH

0.6 FACT AND FANCY IN NUTRITION AND FOOD SCIENCE
(0.7)

Jukes, Thomas H. (Division of Medical Physics, Donner Laboratory, University of California, Berkeley, Calif.)
Journal of the American Dietetic Association 59, No. 3, 203-211 (September 1971)

This paper was presented at the joint meeting of the California and Nevada Dietetic Association in Las Vegas on April 19, 1971.

The environmentalist movement and the misinformation circulated by the news media have greatly heightened public reaction toward the use of chemical technology in the production and processing of food. Some of the more disturbing examples can be used to illustrate the tendency to exaggerate and misinterpret the food-residue problem.

The first of these examples is DDT. The propaganda against that pesticide has created a distrust of all pesticides; yet, says the author, DDT is one of the safest compounds ever to be put in contact with human beings--it has saved more lives and made more people healthy than has any other chemical in the history of the world. Because wild animals pick up other contaminants as well as DDT from the environment (including polychlorinated biphenyls, lead, and mercury), its effects on wildlife are largely unknown.

Mercury is a natural ingredient of the ocean. Hammond (Science 171, 788, 1971) has estimated that the total input of mercury into the oceans from man's activities is between 10^{-2} and 10^{-3} of the 100,000,000 tons of mercury there-- that except in coastal and estuarial areas, man probably hasn't increased mercury concentrations in the sea by as much as 1%. Since the mercury content of marine fish (including

(over)

0.7 ZINC RETENTION IN YOUNG RATS FED INCREASING LEVELS OF HIGH-ZINC OYSTERS
(1.81)(8.42)

Shah, B. G., J. C. Meranger, B. Belonje, and D. S. Deshmukh (Food and Drug Research Laboratory, Department of National Health and Welfare, Ottawa, Ontario K1A 0L2)
Journal of the Fisheries Research Board of Canada 28, No. 6, 843-848 (June 1971)

Most foods contain less than 30 p.p.m. zinc, but oysters reportedly contain more than 1,000 p.p.m. (Schroeder et al., 1967). Whether this large amount of zinc is biologically available has not been determined, although in 1969 O'Dell concluded that the zinc in animal products is more readily available than that in plant products. To determine if this general conclusion applies to oyster products, the authors fed 10 groups of weanling rats, 12 rats to a group, diets containing 12, 60, 120, 240, or 2,000 p.p.m. zinc either as zinc carbonate or as freeze-dried oysters. After 2, 4, or 8 weeks, four rats from each group were killed and their tissues analyzed.

Neither the level nor the source of the zinc significantly affected the rats' body weight, hemoglobin and hematocrit, or cytochrome oxidase activity in the liver homogenates. At the 60-p.p.m. level, the apparent absorption by rats of zinc from oyster powder and zinc carbonate (16.3 ± 3.7% and 18.5 ± 2.2% (SE), respectively) was not significantly different. Up to 260 p.p.m. dietary zinc, the concentration in soft tissues did not increase appreciably; at the 2,000 p.p.m. level, it increased initially and then declined. Levels of zinc in the hair were not affected by either dietary intake or duration of feeding, but above 260 p.p.m. dietary zinc, levels in the bone were increased by both.
[8 figures, 5 tables, 17 references] LB

0.6 (0.7)

tuna, swordfish, and sailfish) is clearly of natural origin, the author believes that the Food and Drug Administration should tell the public so.

The addition of synthetic antioxidants to processed foods draws the wrath of natural-food enthusiasts; yet a typical antioxidant, ethoxyquin, has been shown to prolong the life of experimental mice by 18%. The major antibiotics were found safe for use in animal feeds more than 15 years ago. Their use has improved the health of the animals to which they have been given; and it has significantly increased the yield of the beef, pork, poultry, and eggs used for human food. Yet the residues these products contain are a tiny fraction of the amounts of antibiotics routinely used in medicines. And what is present is destroyed by cooking.

These examples demonstrate how badly the public needs adequate and accurate scientific information, especially on toxicology.

[4 tables, 33 references] LB

0.6 SOYBEANS AS A FOOD SOURCE (4.80)

Wolf, W. J., and J. C. Cowan (Meal Products Investigations and Oilseed Crops Laboratory, Northern Marketing and Nutrition Research Division, Peoria, Ill.)
CRC Critical Reviews in Food Technology 2, No. 1, 81-158 (April 1971)

The production, storage, processing, and uses of soybean-oil protein are reviewed. The conversion of crude soybean oil into salad and cooking oils, shortening, margerine, and lecithin products is given special attention. The processing of soybean flakes into flour and grits, the future of soy protein concentrates and isolated proteins, and the various nutritional properties of these proteins are discussed.

[24 figures, 41 tables, 276 references] LB

0.7 NUTRITION AND MAN'S INTELLECT AND BEHAVIOR

Barnes, Richard H. (Graduate School of Nutrition, Cornell University, Ithaca, N.Y.)
Federation Proceedings 30, No. 4, 1429-1433 (July-August 1971)

The author gives an overview of the complex interrelationships between man's nutrition and his intellectual and behavioral development. He concludes: (1) Severe protein-calorie malnutrition in the infant probably can have long-lasting effects upon behavioral development. Furthermore, retarded intellectual development can be one of the characteristics affected. (2) The very severe type malnutrition is only rarely seen in the United States. At this time, the author states, there is no basis for attempting to predict the possible consequences to mental development of the milder conditions of poor nutrition that are prevalent in the United States. (3) The behavioral changes that will be most prominent in individuals who were severely malnourished in early life probably will reflect changes in emotionality and elevated response levels to aversive stimuli. (4) The behavioral changes in animals that were malnourished in early life appear to be identical to those that result from early social isolation. Social deprivations and nutritional deprivations interact in such a way as to modify the resulting behavioral characteristics. The author suggests, therefore, that it seems highly inappropriate to introduce a type of intervention that would attempt to correct one form of deprivation but not the other. Accordingly, in an area of poverty where severe malnutrition exists, food and nutrition programs and stimulation programs (of the Head-Start type) should be combined.

[13 references] FTP

0.9 (7.0)(2.01) A DIGITAL COMPUTER PROGRAM FOR THE STATISTICAL ANALYSIS OF HEAT RESISTANCE DATA APPLIED TO BACILLUS STEAROTHERMOPHILUS SPORES

Navani, S. K., and J. Scholefield (Department of Food Science, University of Strathclyde, Glasgow C.1, Scotland), and M. R. Kibby (Department of Biochemistry, University of Strathclyde)
Journal of Applied Bacteriology 33, No. 4, 609-620 (December 1970)

Described is a computer program that fits log-linear regression lines to survivor curves and to thermal-destruction-time curves. From the regression, the heat-resistance parameters D, F, z_D, and Q_{10} are evaluated. The program is designed to test the linearity of the observations, the parallelism of the survivor curves, and the significance of the constants; it provides 95% confidence limits for D and z_D. The use of the program is illustrated with heat-resistance data from four strains of Bacillus stearothermophilus spores heated to eight different temperatures (ranging from 100° to 140° C.) for varying times.

[2 figures, 6 tables, 16 references] LB

0.6 (6.37) SINGLE CELL PROTEIN AND THE EXPLOITATION OF MUTANT ALGAE LACKING CELL WALLS

Davies, D. Roy (John Innes Institute, Colney Lane, Norwich NOR 70F, England)
Nature 233, No. 5315, 143-144 (September 10, 1971)

Because of the indigestibility of their cell walls, algae are used directly as human food only with difficulty. As a result, they are either fed to animals or the cell walls are removed by mechanical, chemical, or enzymatic means. So far, all these methods of fractionation, on an industrial scale, involve some solution of formidable economic and technological problems. Now the author has discovered a way of growing mutant forms of green algae that have no cell walls. The wall-less strains grow at rates comparable to those of wild algae; the cells retain quite enough mechanical strength to allow for aeration, stirring, and harvesting by centrifugal separation; the percentage of protein in the cultivated cells (11.79 mg.) is equivalent to that in the wild cells (11.61 mg.); and the differences in amino-acid composition between the two is insignificant.

[1 figure, 1 table, 9 references] LB

0.5 (0.39)(9.19) REMOVAL OF MERCURY COMPOUNDS BY MERCURY-RESISTANT MICROORGANISMS. III. VAPORIZATION OF MERCURY BY A MICROORGANISM

Maeda, Kazuko, Fusae Kanzaki, Terutaka Nakagami, and Kenzo Tonomura (Ferment. Res. Inst., Chiba, Japan)
Chemical Abstracts 74, No. 19, 95783x (May 10, 1971)

0.6 INDUSTRIAL MICROSCOPY

Lyne, P. A., and G. E. Moss
Chemy Ind. No. 15, 388-392 (1971)
BFMIRA Abstracts 24, Supplement, Abstract No. 2293, 473 (July/August 1971)

The industrial applications of microscopy are reviewed. Examples quoted for the food industry are: texture studies in relation to processing methods; particle size distribution analysis; examination and identification of chemically modified starches in foods; examination of contaminated and adulterated foods; and tracing the origin of extraneous matter in foods. C.C.E. Reprinted

1.120 STATUS OF TUNA FISHERIES RESOURCES IN THE ATLANTIC OCEAN

Hayasi, Sigeiti, Tsutomu Koto, Chiomi Shingu, Susumu Kume, and Yasuo Morita (Far Seas Fish. Res. Lab., Shimizu, Japan)
Resources and Fisheries of Tunas and Related Fishes in the Atlantic Ocean - Far Seas Fisheries Research Laboratory, S Series 3, pp. 1-72 (1970) (In English)
Sport Fishery Abstracts 16, No. 2, Abstract No. 13389, 171 (1971)

The status of the resources of yellowfin tuna, albacore, bigeye tuna, bluefin tuna, southern bluefin tuna, skipjack, and marlins and related species in the Atlantic Ocean is given for 1956-1967. Details are given on: distribution and migration; growth and maturation; amount and length composition of catch; stock assessment. Reprinted

1.85 THE AUSTRALIAN PRAWNS INDUSTRY. II. QUALITY ASPECTS (1.017)(8.8) FOR EXPORT PRAWNS

Montgomery, W. A., G. S. Sidhu, and E. M. Christie
Fd Preserv. Q. 30, No. 3, 44-50 (1970)
BFMIRA Abstracts 24, Supplement, Abstract No. 2423, 500 (July/August 1971)

The eating quality of prawns from the Gulf of Carpentaria was assessed by a taste panel. Present handling of these prawns causes the salt content to be increased from 0.4-7% with a concomitant toughening of the prawns. The results from the taste panel indicate that a maximum salt content of 2.5% is acceptable and this is suggested as the maximum level for export. S.M.S. Reprinted

2.1126 GILLNET SELECTIVITY ON SOCKEYE (ONCORHYNCHUS NERKA) AND
(1.30) PINK SALMON (O. GORBUSCHA) OF THE SKEENA RIVER SYSTEM,
(1.01113)(9.3) BRITISH COLUMBIA

Todd, Ian St. P. (Department of Fisheries and Forestry, Vancouver, British Columbia) and P. A. Larkin (Institute of Animal Resource Ecology, University of British Columbia, Vancouver, B.C.)
Journal of the Fisheries Research Board of Canada 28, No. 6, 821-842 (June 1971)

The Skeena River gill net fishery is located along the coast but is concentrated in general near the river mouth. Therefore since it is positioned across the major migratory routes, it could virtually eliminate salmon stocks if continuous fishing were permitted. To guard against this eventuality, fishing is permitted only a short time each week. This regulation tends to ameliorate selectivity by the gear. Even so, if the seasonal timing of various components of migrating fish stocks varies enough, some selection may be inevitable. The authors attempt to determine the nature and degree of selectivity of the nylon nets used in the fishery today, to compare the selective properties and relative efficiency of these nets with those of the linen nets used before 1955, and to estimate the selective action of the fishery as a whole on the long-term composition of sockeye and pink salmon stocks.

The variability in the size of fish taken in nylon nets having mesh sizes ranging from 4-5/8 to 5-5/8 in. was so wide that satisfactory selectivity curves could not be drawn. Both the mean length and the catch of age class 1.2 sockeye and pink increased with mesh size, but the mean size of 1.3 sockeye (which constituted 75% of the 1968 catch) showed no definable trend. These latter fish were (over)

2.08 INOSINE MONOPHOSPHATE (IMP) AND HYPOXANTHINE FORMATION
(1.85)(8.59) IN THREE SPECIES OF SHRIMP HELD ON ICE

Stone, Frederick E. (Marine Fisheries Center, National Marine Fisheries Service, Box 1638, Kodiak, Alaska 99615)
Journal of Milk and Food Technology 34, No. 7, 354-356 (July 1971)

Some investigators have reported that machine-peeled shrimp should be aged in ice or in refrigerated sea water for at least 40 hr. to facilitate peeling. However, other investigators have shown that canned shrimp preconditioned by cooking rather than by chilled aging have more color and better texture than do the shrimp held on ice. Because the content of inosine monophosphate (IMP) and hypoxanthine (Hx) is directly related to the flavor and freshness of fisheries products, and because the activities of the enzymes involved at each step in the degradation pathway of the adenine nucleotides in shrimp are temperature dependent, the author studied the changes that occur as a consequence of ice-holding time in the IMP and Hx contents of three species of shrimp (Pandalus borealis, pink; P. platyceros, spot; and Pandalopsis dispar, sidestripe).

Ion-exchange chromatography showed that the maximum content of IMP appears after that of adenosine monophosphate. Thus the major pathway for the degradation of the adenine nucleotides in the ice-held shrimp resulted in the accumulation of IMP rather than adenosine. During the first 24 hr., IMP increased to 2.0 μM/g. in pink and spot shrimp and to 2.8 μM/g. in sidestripe. After that it decreased, until by the end of 14 days, it was 0.4 μM/g. in pink and sidestripe and 0.7 μM/g. in spot. This result suggests that shrimp should be processed within the first day of capture rather than held for prolonged periods in ice. After they have been about 5 days on ice, their IMP content has fallen to less than 1.0 μM/g., (over)

2.12 MANUAL OF METHODS FOR FISHERIES RESOURCE SURVEY AND APPRAISAL.
(9.10) PART 1. SURVEY AND CHARTING OF FISHERIES RESOURCES

Alverson, D. L. (National Marine Fisheries Service, NOAA, Seattle, Wash. 98102) (editor)
FAO Fisheries Technical Paper No. 102, iii + 80 pp. (June 1971)

Assessments of fisheries potential provide the information needed by industry to design and plan expanded operations and by government to manage the resource. Therefore, resource assessment projects should be designed with a view to existing demands for the resource and to the economic problems interfering with resource utilization. Nevertheless, the design must not cater to immediate needs alone; it must provide the maximum possible information on all aquatic resources, whether their potential for supplying man's needs be current or future, and on the natural factors that affect their availability. These and other considerations are reflected in the design of the survey and data-collection and -processing program that is proposed in this manual.

The major sections of this part are as follows:

"Indirect method for forecasting fisheries potentials" - basic productivity, forecasts from zooplankton abundance, egg and larva surveys, examinations of stomachs of higher trophic forms. [1 table, 12 suggested readings]

"Exploratory fishing surveys" - operational limitations and facilities, selection of species, selecting the study area, selecting vessel and gear, distribution of sampling activities. [4 figures, 12 suggested readings]

"Acoustic surveys" - selection of fishing grounds, evaluation of relative abundance, estimation of absolute abundance, automatic data processing of echo counting information. [5 figures, 7 suggested readings]

2.08 (1.85)(8.59)

whereas their trimethylamine content has increased rapidly. Since IMP content changes rapidly before the change in trimethylamine becomes pronounced, IMP could be used as an early index of the change in quality of shrimp.

The Hx content of pink shrimp at 0 hr. on ice was 0.05 μM/g.; of spot and sidestripe, it was 0.00 μM/g. Hx in all the species increased slowly and steadily until at the end of 2 weeks it was 1.3 μM/g. in pink, 0.9 μM/g. in spot, and 0.8 μM/g. in sidestripe. Since at no time was the increase in Hx abrupt or sharp, Hx content is probably not a good criterion of the onset of spoilage.

[3 tables, 15 references] LB

2.1127 (1.125)(9.2)

THE PRODUCTION OF THREADFIN SHAD AS LIVE BAIT FOR HAWAII'S SKIPJACK TUNA FISHERY: AN ECONOMIC FEASIBILITY STUDY

Chang, Yung Cheng (Economic Research Center, University of Hawaii, Honolulu, Hawaii), and Robert T. B. Iversen (National Marine Fisheries Service, Hawaii Area Fishery Research Center)

ERC publication, viii + 42 pp. (July 1971)

In an earlier analysis of the economic problems of Hawaii's skipjack tuna industry, the senior author concluded that (1) inadequate profit levels account for the current performance of the industry and (2) the future of the industry rests on its ability to increase productivity. One possible way of achieving such an increase is through development of a new bait, an important factor in fishing productivity. The junior author has shown (Special Scientific Report--Fisheries No. 641, August 1971) that threadfin shad, Dorosoma petenense, is a promising bait substitute for the traditional nehu, Stolephorus purpureus, in the skipjack pole-and-line fishery. In this study, the authors examine the economic feasibility of raising the shad for the tuna-fishing market. They find that a yield of 3,660 buckets of shad per 10-acre pond is economically feasible.

[3 figures, 22 tables, 9 references] LB

2.12 (9.10)

"Data collection and recording" - data selection, data records, survey identification and description, station identification and description, catch information, special biological information. [7 figures, 8 suggested readings]

"Data analysis and reporting" - sampling distribution, catch composition, relative abundance, standing stock size, potential production of latent stocks, interpreting results. [15 figures, 8 tables, 13 suggested readings]

This Part 1 also has a glossary and two appendices. [67 references] LB

2.1126 (1.30)(1.01113)(9.3)

among the largest salmon on record and, since they were actually too large to be gilled properly in all the mesh sizes being used, the selectivity of the mesh size could not be determined.

Nylon nets (5-1/4 in. mesh) caught between 2.5 and 2.7 times as many sockeye and between 8.0 and 9.0 times as many pinks as did 5-5/8 in. linen nets. Although the nylon nets caught larger sockeye and pink than the linen nets did, the age, sex, and length characteristics of the fish caught were similar; hence, the selective effects of linen nets were probably similar to those of modern nylon nets.

A comparison of catches and escapements for 1968 showed that the smallest and the largest sockeye are removed from the fishery at a lower rate than are a broad range of intermediate-sized fish. Thus the larger of the 1.2 sockeye and the smaller of the 1.3 sockeye were selectively caught in 1968; the larger pinks (which were extremely small in 1968) were selected by the nets, especially the females.

The authors conclude that the Skeena River gill net fishery has exerted, and could exert, selective effects on sockeye and pink stocks in years when fish in the extreme size classes predominate. However, under more typical conditions, the fishery probably operates with fairly uniform effectiveness over most of the upper range of sizes--with only the smallest pinks and 1.2 sockeye (and jacks, 1.1 sockeye) being underharvested. Although the authors find the long-term consequence of this pattern of selection difficult to assess--since the selection of smaller fish will occasionally be reversed and the periodic closings always enable some fish of all size classes to escape--they conclude that selective fishing is not a major factor in the population biology of Skeena River sockeye and pink salmon.

[15 figures, 20 tables, 29 references] LB

1.951

FUR SEAL INVESTIGATIONS, 1969

National Marine Fisheries Service (Marine Mammal Biological Laboratory, Naval Support Activity, Seattle, Wash. 98115)

Special Scientific Report--Fisheries No. 628, viii + 90 pp. (August 1971)

Two investigations of the distribution and numbers of fur seals (Callorhinus ursinus), their size, reproductive performance, nutritional habits, and diseases are reported. [7 references]

Part I. Fur Seal Investigations, Pribilof Islands, Alaska, 1969; pp. 3-37, 49-72. These studies were conducted on land, in the rookeries, from June to October. [12 figures, 63 tables]

Part II. Pelagic Fur Seal Investigations, 1969; pp. 37-42, 44-48, 73-89. These studies were conducted in the Northeast Pacific, off the coast of Washington, in February and March. [8 figures, 22 tables]

2.00 (3.27) (3.2490)

VARIATIONS IN QUALITY AND SHELF-LIFE OF "FRESH" FISH AND AIR-THAWED "CHILLED" FISH (VERGLEICHENDE UNTERSUCHUNGEN AN "FRISCHEN" FISCHEN UND AN IN DER LUFT AUFGETAUTEN "SROST"-FISCHEN ZUR ERMITTLUNG VON QUALITÄTS-UND HALTBARKEITSUNTERSCHIEDEN)

Rakow, D. (Staatliche Veterinäramt, Bremerhaven, West Germany)

Archiv für Lebensmittelhygiene 21, No. 10, 226-229 (1970) (In German)

Food Science and Technology Abstracts 3, No. 3, 3R107, 501 (March 1971)

The author compared the characteristics of two batches of cod, one stored in ice and one thawed at between 20° and 22° C. after having been stored at -28° C. (or lower) for 12 weeks. From 4 to 10 days after thawing, the thawed fish evidenced a marked deterioration in quality; both volatile base nitrogen and the total number of aerobic bacteria in the muscle increased. The bacterial count in the muscle was greater for the thawed fish than for the iced fish.

[13 references] Extractor: LB

2.114 (1.80)

SEPARATING APPARATUS

Wenzroom, R. T., and T. S. Croton, Jr.; Sidney Gorton & Co., Inc., U.S.A. (pat.)

British Patent 1,229,602, No. 6, Abstract No. 47, 389 (June 1971)

Reprinted

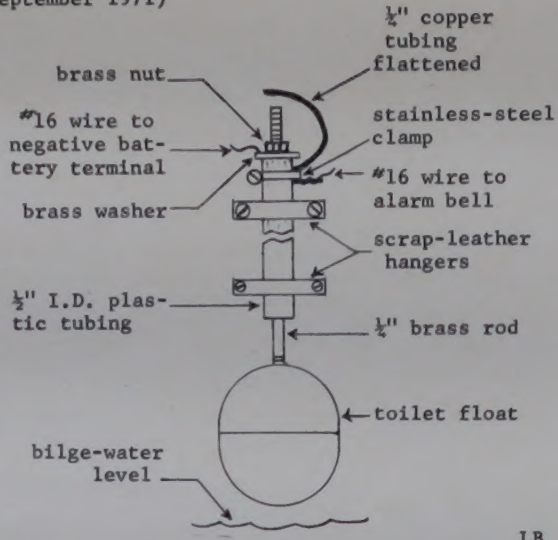
The apparatus is used to separate scallops and like bivalves from undersize shellfish, mud, stones, conches and other debris.

LB

2.119 RELIABLE BILGE ALARM CAN BE BUILT FOR PEANUTS

Anonymous
National Fisherman 52, No. 5, 9B (September 1971)

A relatively simple, effective bilge alarm can be built in less than 1 hr. for about $2. Except for the details of the stop assembly near the top of the brass center post and the No. 16 wire that runs from the positive terminal of the battery to the alarm bell, the drawing on the right is self explanatory.
[1 figure]



LB

2.3 (1.80) METHOD AND APPARATUS FOR REMOVING MEAT FROM THE SHELLS OF BIVALVE MOLLUSKS

Hanks, Fletcher, Jr. (P.O. Box 70, Easton, Md. 21601), and William C. Grieb, Jr. (Chestertown, Md.) (pat.)
U.S. Patent 3,594,859 (July 27, 1971)

The method is applicable to, and the apparatus can be easily modified for, mollusks with or without siphons. Those with siphons are held in oxygen-deficient water to induce them to extend their siphons, then chilled so the siphons will remain extended. Fan-shaped jets of water hold them, siphon down, on a conveyor; the siphons are cut off; and the shellfish are moved to a heat-shock station, where jets of boiling water cause them to open their shells even further. At the final station, high-pressure jets of water directed into the shell, along the contour of the inner face, separate the meat from the shell; the meat falls into a collection facility beneath the conveyor and the empty shells move on for ultimate disposal. These last jets are offset, imparting a rocking motion to the moving shellfish, and are adjusted so that the water contacts as little of the meat as possible. They are also arranged in sets, operating with increasing water pressure so that shellfish which are harder to shuck will eventually reach jets of sufficient intensity to cut their adductor muscle and remove their meat. LB

2.3 (2.01) EFFECTS OF WASHING FRESHWATER FISH ON KEEPING QUALITY

Gillespie, D. C. (Fisheries Research Board of Canada Freshwater Institute, Winnipeg 19, Manitoba), and Kurosh Ostovar (Department of Food Science and Industry, Pennsylvania State University, University Park, Pa.)
Journal of the Fisheries Research Board of Canada 28, No. 5, 783-785 (May 1971)

Many members of the Canadian fresh-water fishing industry strongly oppose washing fish before they are packaged and shipped. Their theory is that slime is good for quality and that slime protects the fish during shipping. They claim that washed fish become soft and pale and turn sour after a day or two of storage at from 2° to 3° C. The present study was undertaken to demonstrate the fallacies of this deeply entrenched theory. It examines the ability of fish slime to support bacterial growth as well as the effects of washing on the fish's keeping quality, as determined from bacterial counts and organoleptic scores.

Bacterial counts on fish slime fron northern pike (Esox lucius), walleye (Stizostedion vitreum vitreum), lake whitefish (Coregonus clupeaformis), yellow perch (Perca flavescens), and channel catfish (Ictalurus punctatus) were taken first at 0 time (16 hr. after capture and original icing) and then on the diluted slime, stored for up to 6 days at either 3° or 20° C. Initial counts varied from 10^3 to 10^8 organisms/g. of slime; maximum counts at 20° C. were in the range of 10^9 to 10^{10}/g. The variations in initial count, the species of fish, or the water from which the fish were taken were unrelated. An acrid odor typical of spoiled fish emanated from the bacterial growth.

(over)

2.3 (1.80) METHOD FOR SHUCKING AND EVISCERATING BIVALVE MOLLUSKS

Nelson, Richard W., Robert F. Mackin, and Wayne I. Tretsven (U.S. Department of the Interior) (pat.)
U.S. Patent 3,594,860 (July 27, 1971)

Bivalve mollusks are mechanically shucked and eviscerated in a continuous, four-step process. A high-temperature flame causes the shell to gape; a rigid shucking bracket snags the upper half of the shell, breaking it free from the lower half; water jets loosen the viscera from the shell and a suction pump draws the loosened viscera into the water-suction intake (this turbulence tends to loosen sand and residue and cleanse the meat); then the muscle is separated from the lower half of the shell by intense heat, as in step one.

[See COMMERCIAL FISHERIES ABSTRACTS 23, No. 9, p. 13 (September 1970).]

LB

2.3 METHOD AND APPARATUS FOR EVISCERATING SHELLFISH (1.80)

Wenstrom, R. T., and T. S. Cotton, Jr.; Slade Gorton & Co., Inc., U.S.A. (pat.)
British Patent 1,229,603
BFMIRA Abstracts 24, No. 6, Abstract No. 1895, 389 (June 1971)

2.3 (2.01)

The bacterial counts on undressed fish stored at 3° C. for up to 11 days were similar to those for the slime dilutions. Even at 0 time, counts on the unwashed fish were 100 times higher than those on fish washed for 5 min. under cold-water jets, which procedure removes only the loose slime--it does not clean the fish thoroughly. After 11 days' storage, the flesh from the washed fish had a pronouncedly spoiled odor, even though it contained few bacteria. The flesh of the unwashed fish had a very low bacterial count after 8 days' storage, but the acrid-putrid odor was quite strong. Evidently the odorous products from the decomposed slime diffuses through the fish's skin and makes the flesh inedible.

After 1 day's storage, bacterial counts on unwashed commercial whitefish were 20 times higher than on washed fish. In contrast, organoleptic scores (basically appearance and odor) were higher for unwashed fish for the first 2 days, possibly due to the less familiar appearance of the washed fish. On the third day, the scores were even; and from then on, the scores for the unwashed fish dropped rapidly, while those for the washed fish remained relatively unchanged.

Although the authors made no attempt to remove all the slime during these experiments, decided differences in the bacterial numbers and the keeping quality of the washed and unwashed fish were evident. They suggest that more thorough washing could probably reduce coliform organisms to an undetectable level. They conclude by pointing out that no matter how beneficial slime may be to live fish, it is detrimental to the quality of dead fish because of its ability to support vigorous bacterial growth.

[1 figure, 3 tables, 5 references]

LB

2.3 (1.92) CATFISH LEAFLET

Anonymous
Feedstuffs 43, No. 35, 33 (August 28, 1971)

A 12-page leaflet, "Hold That Catfish Flavor," is now available free from Dr. George A. Schuler, Cooperative Extension Service, University of Georgia, Athens, Ga. 30601.

LB

2.119 GUIDE TO USE OF SEA ANCHORS

Anonymous
Commercial Fishing 10, No. 7, 14 (July 1971)

The Marine Department of New Zealand has issued a simple guide for the proper construction and correct use of sea anchors. Thus the safety of fishing vessels and small craft can be greatly improved in bad weather.

A sea anchor should be made of good-quality canvas. It should be cone shaped, with both ends open. For boats up to 45 ft. long, the diameter of the larger end should be 1 in. for each foot of boat length; for boats between 45 and 75 ft., a maximum diameter of 3 ft. 9 in. is effective. (For boats longer than 75 ft., a preconstructed sea anchor is impractical, so, should the weather necessitate, one would have to be improvised from any material available--trawls, trawl doors, canvas awnings, fish baskets, or floor boards.) A hawser three times the length of the boat and at least 2.5 in. in diameter should be attached to the bridle of the sea anchor. A tripping line 2 fathoms longer than the hawser should be attached to the smaller end of the cone. To reduce the effects of breaking seas, a canvas oil bag may be attached to the sea anchor near the point where the tripping line is attached.

In operation, the sea anchor is streamed from the bow by the hawser. To minimize chafing, the hawser should be protected at the point where it passes overboard. The sea anchor is pulled back aboard by the tripping line.

[1 figure]

LB

2.3 (1.81) DEVELOPMENT OF IMPROVED TECHNIQUES FOR SHUCKING PACIFIC OYSTERS

Smith, John D. (Pacific Northwest Laboratories, Battelle Memorial Institute, Richland, Wash. 99352)
Washington Sea Grant Publication WSG 71-1, ii + 40 pp. (May 1971) (Division of Marine Resources, University of Washington, 3716 Brooklyn Ave. N.E., Seattle, Wash. 98195)

The objectives of this study were to identify and assess the feasibility of new or improved methods for automated shucking of Pacific oysters. A secondary goal was the identification of techniques to facilitate hand opening to reduce labor requirements.

Exploratory experiments were performed with both single and clustered oysters on potential treatments and treatment combinations including: cryogenic freezing, chemical treatment, ultrasonic energy, explosive decompression, electrical shock, local heating, mechanical shock and vibration, carbon dioxide, microwave heating, vacuum, vacuum with microwave pretreatment, and anesthetic agents.

In all, twelve techniques or combinations of techniques were investigated.

The only method investigated that was found capable of adaptation to fully automated oyster shucking was cryogenic freezing followed by peripheral thawing. Such a process is economically feasible in that the material cost for operation is approximately 98¢ per gallon of shucked oyster meat.

The most effective method of producing oyster shell gaping was found to be by treatment involving exposure to an aqueous magnesium chloride solution. Further development of this process is warranted to optimize ion concentrations, temperature, residence time, composition and concentration of additives for use in preheating Pacific oysters for hand shucking.

[6 figures, 13 tables, 5 references, identification and brief description of 46 patents]

Reprinted in part

2.43 MOISTURE CONTENT AND SHELFLIFE. (PART 2, CONCLUSION)

Heiss, R., and E. [K.?] Eichner (Institut für Lebensmitteltechnologie und Verpackung E.V., Munich, Germany)
Food Manufacture 46, No. 6, 37-38, 41-42 (June 1971)

In contrast with the spoilage reactions discussed in Part 1 [see "Commercial Fisheries Abstracts" 24, No. 10, p. 10], autoxidation of lipids increases with decreasing moisture content. Water has a protective effect that steadily increases as the moisture content of a food rises to a point that is in equilibrium with a relative humidity of 50% (at RH 50.0%, moisture content is about 4.8%; at RH 18.5%, it is about 2.7%). This effect is operative even at moisture levels lying below that of the theoretical monolayer, probably because the formation of hydrogen bonds with hydroperoxides stabilizes the hydroperoxides and inhibits their decomposition to the free radicals that promote oxidation. Or it may be that the coordination spots of traces of heavy metals are occupied by water molecules, thereby partially decreasing the oxidation-catalyzing effect. In any event, because human senses can detect even extremely small concentrations of the rancid products that are formed when fats are oxidized, the protection of a product against the effects of oxygen raises more problems than does the protection against the effects of water vapor.

The authors then discuss the interdependence of chemical and microbiological reactions--including those responsive to temperature--their extent, their effect on the human senses, and the consequences for typical foods and for packaging. Rather than the usual primitive method of simply testing different packaging materials with a product, they offer an equation for calculating shelf life (t_k) that

(over)

3.234 BLUE CRAB MEAT
(1.86)(3.2383)
(3.2497)(3.12)
(3.2381)

Strasser, Jurgen H., and Jean S. Lennon (Central Engineering Laboratories, FMC Corporation, 1185 Coleman Ave., Santa Clara, Calif. 95052), and Frederick J. King (National Marine Fisheries Service Technological Laboratory, Gloucester, Mass. 01930)
Special Scientific Report--Fisheries No. 630, 1-26 (July 1971)

I. Preservation by Freezing. pp. 1-13.

It is well known that the storage stability of frozen seafoods, in general, can be influenced by the following factors: method (rate) of freezing, method of packaging, and storage temperature and its duration. For example, it is known that techniques such as cryogenic freezing (vs. plate, air blast, or brine immersion freezing), vacuum packaging (vs. a loose-fitting package containing air) and storage below 0° F (vs. storage at 0° F or above) may prolong the storage life of seafoods. In the case of blue crab meat or meat from other crustaceans, the relative importance of these techniques in determining frozen storage stability has received very little attention. Consequently, the objective of the present investigation is to compare each of these techniques in various combinations with other preservation techniques in order to discover which procedures are required to preserve blue crab meat for 2 to 8 months without any significant loss in the desirable qualities of freshly picked meat.

The results indicate that a rapid freezing rate [1 or 2 min.], storage below 0° F, and vacuum packaging [in heat-sealed pouches of laminated polyethylene-aluminum foil-mylar] are preferable to minimize losses in the desirable qualities of freshly picked meat. [5 figures, 2 tables, 24 references]

(over)

3.231 A NEW MACHINE FOR COATING FISH WITH FLOUR

Zhernakova, G. V. (Kaliningradskii Rybokonservnyi Kombinat, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 6, 59-60 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R94, 500 (March 1971)

Coating fish meat with flour protects it from burning and improves its texture, flavor, and appearance. However, the coating process is time consuming. With the machine described here, the fish are conveyed by roller through a sealed coating box in a direction opposite to that of a flow of flour. Surplus flour is eliminated by a vibrating sieve. The machine is easily operated and serviced. The basic economic parameters of this machine are compared with those of existing machines of other types.

Extracted: LB

3.231 APPARATUS FOR PRODUCING MIXED SUBDIVIDED FOOD MATERIAL

Hollymatic Corporation (U.S.A.) (pat.)
British Patent 1,229,513
BFMIRA Abstracts 24, No. 6, Abstract No. 1890, 389 (June 1971)

Using this method, an extremely uniform mixed mass of subdivided meat or fish can be made. The starting material can be a block of frozen meat. Reprinted

3.336 METHODS FOR THE ELIMINATION OF CARBAMIDE FROM SHARK MEAT
(2.3)(1.7)

Skachkov, V. P. (Azcher NIRO, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 6, 71-73 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R111, 502 (March 1971)

Shark meat contains 2% carbamide, which breaks down into ammonia during heat processing. This carbamide can be reduced by from 42.5 to 60% (leaving residual concentration of 0.6 to 1%) by leaching the fresh or the salted meat. However, leaching fresh meat for more than 4 hours is undesirable, for protein losses will be high and the nutritional value of the meat, consequently, will be lowered. Since salted meat loses less protein during leaching, the process can be more prolonged than with fresh meat. Dry salting is not advisable, since it leads to dehydration and protein losses.

Extractor: LB

3.336 HEAT PENETRATION INTO RECTANGULAR FOOD CONTAINERS
(3.338)

Alles, L. A. C., and N. D. Cowell
Lebensm.-Wiss.+Technol. 4, No. 2, 50-53 (1971) (In English)
BFMIRA Abstracts 24, Supplement, Abstract No. 2559, 527 (July/August 1971)

The derivation of parameters used in process calculations for canning food in rectangular containers of conduction-heating material is discussed in detail. Four approaches were tried, three of which were considered to be satisfactory.

Reprinted C.S.B.

3.2386 NEW TOOLS FOR THE PACKING OF KLIPFISH, STOCKFISH, SALTED AND FROZEN FISH

Engeseth, Egon M. (Norsk Signode A/S, Asker, Norway)
Norwegian Fishing and Maritime News 18, No. 2, 35 (1971)

Traditionally dried and salted fish have been packed in paper or wooden boxes secured either by ropes or steel bands. Tightening such fastenings by hand, a frequent method, is tiring and uneconomical; moreover, metal bands tend to corrode. Now extruded monofiber nylon bands are available. They are characterized by elasticity, good elongation (up to 15%), resistance to chemicals and temperature variations (-40° to +40° C.), a strength of 45 kg. per 2 m., and good machineability. This article describes two types of tools that can weld 13-mm. bands in about 1.5 sec., the weld having the same strength as the band itself.

The pneumatically operated hand tool permits an operator to band about three packs of klipfish a minute, two bands to a pack, or 450 29-kg. cartons, two bands to a carton, every 8-hr. shift. It can be used for all types of boxing, including securing the palletized units. The automatically operated tools have a capacity of 20 bands per minute. It is operated by a pedal. The operator places the carton in the band frame; the machine automatically encircles the carton with a band and then tightens, welds, and cuts the band. On the basis of 1-m. cartons, it can fix 1,000 bands an hour.

When 6-mm. bands are used, 50 bands a minute can be fixed with either type tool. This new range of tools could be of particular value to the frozen fish and canned food industry, the author suggests. [1 figure] LB

3.336 (0.5) BACTERIAL DECONTAMINATION BY ELECTROPHORESIS OF AQUEOUS COOKING SALT COLOURING BATHS FOR INDUSTRIAL PREPARATION OF SEA-SALMON PRODUCTS
[DIE BRAUCHBARKEIT DER ELEKTROPHORRESE FÜR DAS ENTKEIMEN WÄSSRIGER, KOCHSALZHALTIGER FARBBÄDER IN SEELACHS-ERZEUGNISSEN)

Wittfogel, H. (St. Veterinaruntersuchungsamt, Cuxhaven, West Germany)
Archiv für Lebensmittelhygiene 21, No. 8/9, 191-193 (1970) (In German)
Food Science and Technology Abstracts 3, No. 3, 3R112, 502 (March 1971)

To determine whether or not the bacteria in aqueous cooking salt could be removed electrophoretically, the author conducted an experiment using a 7×38×30 cm. tank, copper electrodes separated by 32 cm., a current of 1.75-2.0 v. and 0.6 a., and salt concentrations of from 2 to 16%. The salt reduced the current in the electrical field, thus decreasing the destruction of bacteria; the color of the bath varied from salmon red to dirty brown; and a froth formed in the tank. The author does not recommend this procedure for processing salmon products.
[17 references] Extractor: LB

3.3 THE CANNED FISH INDUSTRY IN POLAND (1.0144)

Markowski, B. J.
Rev. Conserve. 27, No. 12, 79-84 (1970) (In French)
BFMIRA Abstracts 24, No. 6, Abstract No. 1694, 355 (June 1971)

The production, techniques, equipment and quality control methods of the Polish fish industry are reviewed. C.C.E. Reprinted

---

2.43

is valid if water-vapor sorption is the determining factor in limiting the shelf life of a packaged food:

$$t_k = \Delta RH/q \times Tr/100\ F \times \tan \alpha \times 2.303 \log Wa\text{-}w_f/Wa\text{-}w_k$$

where q (expressed in g./m^2d) is the permeability of the package to water vapor
ΔRH is the RH difference under testing conditions for evaluating q
F (in m^2) is the surface of the whole package
Tr (in g.) is the dry weight of the packaged food
w_f (in % of dry weight) is the initial water content of the freshly prepared and packaged food
w_k (in % of dry weight) is the critical water content of the packaged food
Wa (in % of dry weight) is the water content of the food in equilibrium with RHa ["a" refers to the ambient atmosphere]

With this equation, the permissible water-vapor permeability of a package for a fixed turnover time under distinct atmospheric conditions can also be calculated. Thereby, the most suitable and least expensive packaging materials can be selected.
[8 figures, 9 references] LB

2.3 A PRAWN SORTING MACHINE (1.85)

E.M.S. Holdings Pty. Ltd. (Australia) (pat.)
British Patent 1,231,673
BFMIRA Abstracts 24, No. 7, Abstract No. 2191, 451 (July 1971)

A machine, suitable for sorting large quantities of shrimps or prawns without damage to the edible portion, is described. Reprinted

---

3.234 (1.86)(3.2383)(3.2497)(3.12)(3.2381)

II. Effect of Chemical Treatments on Acceptability. pp. 15-26.
Several chemical treatments were tested as adjuncts to preservation of blue crab meat. Most of these samples were preserved by freezing but some were heat-preserved or freeze-dried. In general, the dip treatments studied did not improve the quality of the preserved samples. However, glazing treatments with some of these chemical solutions [e.g., ascorbic acid and tripolyphosphate-sodium chloride solutions] appeared to improve the quality of frozen-stored samples.
[1 figure, 9 tables, 37 references] Reprinted in part

3.336 (3.34)(3.335) CHANGES IN THE SALT CONTENT AND ACIDITY OF STORED TINNED FISH IN TOMATO JUICE

Dominova, S. P., and L. A. Kuznetsova (Kaliningradskii Tekhnicheskii Inst. Rybnoi Promyshlennosti i Khozyaistva, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 4, 81-83 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R79, 497-498 (March 1971)

The authors studied the changes during storage of the salt content and the acidity of the solid parts and of the dressing (sprats and fish dumplings) of fish canned in tomato juice. They found that salt content and acidity increased in the solid parts and decreased in the dressing hyperbolically, the curves being symmetrical and their approach asymptotic. After 30 days of storage, the salt content of the solid parts stabilized; the meat was juicy and the flavor good. Except for insignificant changes in the color of the tomato juice, no further substantial changes occurred for another 3 months. The experiment proved that salting the dressing will give results equivalent to preserving the fish by canning it in brine.

Extractor: LB

3.336 (3.5) ABSORPTION SPECTRA OF RAW BRINES

Rzhepishevskii, P. M. (Odesskii Tekhnologicheskii Inst. Pishchevoi i Kholodil noi Promyshlennosti, U.S.S.R.)
Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya 1970, No. 3, 42-44 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R80, 498 (March 1971)

The absorption spectra of salt solutions used on herring caught at different times and from different parts of the Atlantic were studied at wavelengths ranging from 220 to 2,000 nm. The character of the spectra was identical in all instances--extinction decreased as the wavelength increased; peaks occurred at 250-255 nm. and at 405-410 nm. Knowledge of the site of these two peaks makes it possible for the processor to apply the Lambert-Beer law when diluting salt solutions, since the extinction value changes relative to the lowered concentration of the solution and to changes in the degree of dispersion.
[1 reference] Extractor: LB

3.4 FOOD SMOKING PROCESS

Fessman, G. (pat.)
Japanese Patent 267/71
Food Technology 25, No. 7, 81 (July 1971)

Wood meal is treated with superheated steam to produce a medium useful in smoking foods. FTP

3.5 (3.335) THE PRODUCTION OF DRIED FILLETS FROM CARTILAGINOUS OCEAN FISH

Skachkov, V. P. (Azcher NIRO, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 5, 61-63 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R78, 497 (March 1971)

Salted, dried fillets resembling those from sturgeon can be made by injecting anchovy fat at 5- or 6-cm. intervals into the meat of cartilaginous ocean fish. The fat added should equal 1.5% of the weight of the meat. According to the dynamics of fat distribution, the fat is distributed in three zones: the zone marked by the point of injection (1 cm.), the zone in which the fat will distribute as a result of mechanical forces (6 cm.), and the zone in which it will distribute as a result of capillary pressure (6 to 8 cm.); 80% of the fat will remain in the first two zones. Within 3 days, the fat will be distributed in the meat to an average concentration of 3%. The fillets are dried at an air temperature of from 22° to 25° C. Extractor: LB

3.4 MEAT SMOKING APPARATUS

Swift, J. R., and P. T. Holloway (pat.)
U.S. Patent 3,565,051
Food Technology 25, No. 7, 78 (July 1971)

The apparatus consists of a smoke generator, a blower, and duct work to conduct the smoke from the generator to the smoke house. FTP

3.4 LINE FOR COLD-CURING FISH

Adigamov, K. Kh., B. A. Baidikov, A. P. Anisimov, V. M. Weinberg, S. L. Grachev, R. T. Gureeva, V. P. Zabiakin, A. T. Ledovskikh, G. P. Tkachenko, V. N. Podsevalov, A. I. Filatov, E. I. Frolovich, V. A. Shcherbakov, and N. N. Cheprasov (Kaliningradskoe tsentral'noe konstruktorskoe byuro Ministerstva rybnogo khozyaistva SSSR) (pat.)
U.S.S.R. Patent 269,697 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R122, 503 (March 1971)

The line for cold-curing fish consists of four series-connected units: a machine for threading the fish onto sticks, a device for opening the gills, a curing oven, and a machine for removing the fish from the sticks. All units are interconnected by a transfer conveyor and are secured to a common platform that moves along the curing oven so that the oven's chamber can be successively loaded. The machine for removing the fish from the sticks is installed at the discharge end of the oven. Extractor: LB

3.4 (1.24)(1.123) (1.11) POLYCYCLIC AROMATIC HYDROCARBONS IN SMOKED FISH, KATSUOBUSHI

Masuda, Yoshito, and Masanori Kuratsune (Fac. Med., Kyushu Univ., Fukuoka, Japan)
Chemical Abstracts 75, No. 5, 34088y (August 2, 1971)

4.11 CHROMATOGRAPHY OF UNUSUAL LIPIDS ON THIN LAYERS OF MAGNESIUM OXIDE

Kaufmann, H. P., H. K. Mangold, and K. D. Mukherjee (Bundesanstalt für Fettforschung, Munster, Westf. Germany)
Journal of Lipid Research 12, No. 4, 506-509 (July 1971)

The authors applied thin layers of magnesium oxide, and mixed adsorbents containing magnesium oxide, in the fractionating of classes of lipids that cannot be resolved satisfactorily by thin-layer chromatography on silica gel.
[1 figure, 29 references] FTP

4.11 (4.12) REACTION OF α,α'-DIPHENYL-8-PICRYLHYDRAZYL WITH OLEFINIC FATS. 2. MODEL STUDIES ON THE DETERMINATION OF SPOILAGE CAPACITY OF OLEFINIC FATTY SUBSTRATES

Linow, Fritz, and Joachim Pohl (Zentralinst. Ernaehr., Potsdam-Rehbruecke, Germany)
Chemical Abstracts 75, No. 5, 34168z (August 2, 1971)

3.4 SMOKE AROMAS IN THE FISH INDUSTRY
(ÜBER DIE RAUCHWÜRZUNG IN DER FISCHINDUSTRIE)

Henning, W. (Inst. für Nahrungsmitteltechnik der Henning KG, Hamburg 61, West Germany)
Allgemeine Fischwirtschaftszeitung 22, No. 17, 35 (1970) (In German)
Food Science and Technology Abstracts 3, No. 3, 3R103, 501 (March 1971)

Although the author gives no details of the procedure or the additives he uses, he discusses a method designed to replace the conventional smoke treatment of foods. Unsmoked foods are mixed with smoked foods and are thus enriched with smoke aromas. Extractor: LB

3.4 MECHANIZATION OF COLD SMOKING OF FISH

Volodchenko, I. L. (Kuibyshevskii Rybookbabatyvayushchii Zavod, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 6, 55-58 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R93, 499-500 (March 1971)

The described method for cold smoking fish is said to save labor and improve efficiency. It is based on the following principles: use of rotary equipment that combines transport with processing; formation of the conveyor into closed circuits by simple devices; combining boxes for drying and smoking; and adoption of a conveyor system applicable to universal smoking methods. Because the rhythms of washing, smoking, and drying are different, use of two conveyors of different capacity is necessary. [1 reference] Extractor: LB

3.337 PRIMARY TREATMENT OF WASTE WATER FROM SALMON CANNING PLANTS
(9.19)(6.55)

Claggett, F. G., and J. Wong (Fish. Res. Bd. Canada, Vancouver, B.C., Canada)
Chemical Abstracts 75, No. 4, 24974v (July 26, 1971)

3.337 FREE AMINO ACIDS IN CANNED FISH
(3.34)(8.51)

Lapshin, I. I., and T. G. Rodina (Moskovskii Inst. Narodnogo Khozyaistva im. G. V. Plekhanova, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 6, 64-66 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R92, 499 (March 1971)

Because free amino acids affect the specific flavor and aroma of fish canned in oil, the free amino-acid content of various types of fish that had been treated with smoking liquid and canned in oil was studied. The quantity of amino acids in the canned fish largely depended on storage time. The content of alanine, arginine, tyrosine, cysteine, cystine, valine, methionine, and lysine in individual cans was not appreciably different. The amount of the other amino acids depended on the species and origin of the fish. As a result of protein hydrolysis and destruction, the content of free amino acids increases as storage increases.
Extractor: LB

4.91 EVIDENCE FOR NONESSENTIALITY OF LINOLENIC ACID IN THE DIET OF THE RAT

Tinoco, J., M. A. Williams, I. Hincenbergs, and R. L. Lyman (Department of Nutritional Sciences, University of California, Berkeley, Calif. 94720)
Journal of Nutrition 101, No. 7, 937-946 (July 1971)

The purpose of this experiment was to determine whether linolenic acid is essential in the diet of the rat. Female weanling rats were raised on a diet containing 1.25% methyl linoleate (2.7% of calories) as the only source of fatty acids The control group of rats was given a diet containing 1.0% methyl linoleate and 0.25% methyl linolenate. The effect of these diets on growth and reproduction was examined. The results indicated that linolenic acid does not appear to be essential for growth or reproduction in rats.
[8 tables, 15 references] FTP

4.92 ACUTE AND SUB-ACUTE TOXICITY OF UV IRRADIATED OIL FOR MICE
(3.15)

Miura, Toshiyuki, Masako Tsuchida, Takashi Muto, and Komei Miyaki (National Institute of Health (2-10-35) Kamiosaki, Shinagawa-ku, Tokyo, Japan)
Journal of Japan Oil Chemists' Society 20, No. 5, 38-43 (May 1971) (In Japanese; figures, tables, and abstract in English)

Edible oil that had been irradiated by a germicidal lamp was toxic when fed to mice. [13 figures, 1 table, 26 references] FTP

3.9 CHEMICAL PRESERVATION OF FISH AND WASTE OF FISH
(6.50) UNDER TROPICAL CONDITIONS

Markmann, H., and B. Dittmann (Sekt. Tierprod., Univ. Rostock, Rostock, Germany)
Chemical Abstracts 74, No. 23, 123844p (June 7, 1971)

3.9 ARTIFICIAL RIPENING OF MAATJES-CURED HERRING WITH THE AID OF PROTEOLYTIC ENZYME PREPARATIONS

Ritskes, T. M. (Institute for Fishery Products TNO, IJmuiden, Netherlands)
Fishery Bulletin 69, No. 3, 647-654 (July 1971)

For manufacturing maatjes-cured herring, the herring caught in the North Sea or Irish Sea is suitable only during months when the proteolytic activity of the appendices pyloricae is sufficiently high. For instance, only North Sea herring caught from May to July has sufficient proteolytic activity for the manufacture of a well-ripened product. For herring caught in other areas, this period may differ considerably. The present work shows that it is possible to use herring caught in other seasons if protease preparations are added to the fish together with salt. The herrings were examined organoleptically, whereas the brines were examined by chemical analysis and by chromatography on Sephadex G-25. No significant differences were found between naturally ripened herring and herring cured by the aid of enzyme preparations. The lipase content of the preparation should be low enough in order to avoid the formation of a fatty acid taste in the cured fish. [5 figures, 7 tables, 8 references] Author's abstract

---

4.92 (1.23) CARCASS COMPOSITION OF CHICKENS FED CARBOHYDRATE-FREE DIETS CONTAINING VARIOUS LIPID ENERGY SOURCES

Edwards, Hardy M., Jr., and Paul Hart (Department of Poultry Science, University of Georgia, Athens, Ga. 30601)
Journal of Nutrition 101, No. 8, 989-996 (August 1971)

In two experiments, two pens of 10 White Leghorn cockerels were fed either oil or glucose monohydrate as the major dietary energy source. The effect of the energy source on the chicks' development is shown below.

Major source of energy	Effect on the chicks of the dietary energy source									
	at 3 weeks				at 6 weeks				at 8 weeks	
	Body wt.		Mort.*		Body wt.		Mort.*		Body wt.	Mort.*
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(1)
	g.		%		g.		%		g.	%
Glucose monohydrate (control)	203	196	10	0	504	489	10	0	700	10
Corn oil	142	137	0	5	383	303	5	5	542	5
Lard	149	132	10	5	354	286	25	5	524	35
Linseed oil	140	132	0	0	344	269	0	0	517	15
Menhaden oil	--	68	100	10	---	129	100	30	--	100
Pooled standard error of the mean	±27	±19			±85	±47			±119	

* Cumulative percentage of mortality
(1) first experiment; (2) second experiment

These results confirm those of earlier studies, which showed that chicks will grow normally on diets containing lard, soybean oil, or glycerol- or glucose-

 (over)

6. THE USE OF LIGNONSULPHONATE BINDERS IN PELLETING

Friedrich, W., and Karl F. Robohn (Institute for Feed Technology Research, Germany)
Feedstuffs 43, No. 34, 22 (August 21, 1971)

The authors determined the effect of lignonsulfonate binders on the power required to pellet two swine feeds and on the durability of the pellets so formed. Constants in the tests were the pellet press (flat bed, 5/32-in. diameter holes, 2 in. thick) and the feed rate to the pellet mill (2,200 lb./hr.). Variables were the binder level (0, 1.5, and 3.0%), the steam pressure (0.3-0.4 atm. or 105°-110° C.), the conditioning agent (either water or steam, proportioned to provide a total increase of 3% in the moisture content of the conditioned mash), and the feed ingredients (see table below).

Feed ingredient	Percent contained in:	
	Feed 1	Feed 2
Grain	52.0	52.0
Tapioca root meal	16.0	16.0
Soybean meal	10.5	7.5
Wheat byproduct meal	10.0	7.0
Fish meal	5.0	5.0
Mineral premix	1.4	1.4
Vitamin premix	0.1	0.1
Sugar	5.0	--
Potato starch	---	5.0
Bean meal	---	3.0
Alfalfa meal	---	3.0

Steam was more effective than water as a conditioning agent, for it reduced the power required for pelleting and increased pellet durability. Lignonsulfonate binders also increased pellet durability and slightly reduced power requirements.
[Translated and condensed from an article in "Kraftfutter" by Dr. Harry Pfost, Kansas State University, Manhattan, Kans.]
[5 figures, 1 table] LB

6.190 THE EFFECTS OF FISH MEAL, METHIONINE AND DIFFERENT CEREAL GRAINS IN DIETS OF YOUNG TURKEYS

Potter, L. M., A. T. Leighton, Jr., and C. E. Howes (Department of Poultry Science, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061)
Poultry Science 50, No. 4, 1100-1108 (July 1971)

The purpose of this study was to determine the relative feeding value of various cereal grains in the diets of young turkeys and to determine the effects of adding fish meal and methionine to their diet. The test diets were evaluated for young turkeys raised from 1 day to 8 weeks of age (first series) and for turkeys raised from 8 to 18 weeks of age (second series).

In the first series of experiments, the body weights (after 8 weeks) of the turkeys fed diets containing 0, 4, and 8% fish meal were 1707, 1724, and 1721 grams, and the feed efficiencies were 0.5068, 0.5117, and 0.5079, respectively. The differences were not statistically significant. The average body weights (after 8 weeks) of the turkeys fed diets containing 0 and 0.05% methionine (added) were 1704 and 1731 grams (statistically significantly different) and their feed efficiencies were 0.5087 and 0.5089, respectively. The turkeys fed diets containing corn, barley, wheat, and milo showed body weights of 1721, 1666, 1763, and 1720 grams and feed efficiencies of 0.5231, 0.4877, 0.5097, and 0.5147, respectively (differences greater than 30 grams in body weight and 0.0065 in feed efficiency were significant).

In the second series of experiments, the average weight-gains and feed efficiencies (8 to 18 weeks) of turkeys fed diets containing 0, 3, 6, and 9% fish meal were 3045, 3098, 3085, and 3086 grams and 0.2280, 0.2358, 0.2300, and 0.2282,

(over)

6.190 (1.71) DOGFISH MEALS AS SUPPLEMENTS FOR POULTRY RATIONS

March, B. E., and Jacob Biely (Department of Poultry Science, The University of British Columbia, Vancouver, B.C., Canada), F. G. Claggett, and H. L. A. Tarr (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver 8, B.C.)
Poultry Science 50, No. 4, 1072-1076 (July 1971)

Twelve experimentally manufactured dogfish meals and one dogfish protein concentrate were tested for their nutritional value as sources of supplementary protein and metabolizable energy for the chick. Additional analyses and tests to assess the value of the meals included those for proximate composition, amino acid, hot-water-soluble protein, available lysine, and pepsin-digestible protein. The supplementary value of the protein of the meals and concentrate was determined in diets where the meal supplied 4% or 8% of the protein.

The supplementary values of the protein of the meals (including the concentrate) were consistently lower than the values reported (in the literature) for meals made from teleost fish. The meals showed low values for chemically estimated lysine availability. The values for pepsin-digestibility of the protein of the meals were also low. The authors state that the relatively poor nutritive value of the meals may be partly due to the adverse effects of the processing conditions necessitated by the nature of the raw material.
[4 tables, 10 references] FTP

6.10 RECENT ADVANCES IN THE FISH BYPRODUCTS INDUSTRY

Meade, Thomas L. (Department of Fisheries and Marine Experiment Station, Graduate School of Oceanography, University of Rhode Island, Kingston, R.I.)
CRC Critical Reviews in Food Technology 2, No. 1, 1-19 (April 1971)

The fish byproducts industry has grown more rapidly over the past several years than has any other segment of the fisheries industry. Fish meal, the primary product of the industry, was produced in 1968 in quantities over three times as great as in 1958. This tremendous increase is due to improved fishing methods, expansion of established fisheries, and the development of new fisheries, particularly the anchoveta fisheries of Chile and Peru. Although markets for fish meal were severely disrupted during the early period of expansion, they have become relatively stable since, providing the basis for a profitable byproducts operation. The contribution and location of future fisheries are speculated upon.
[9 tables, 37 references] LB

6.130 ANAEROBIC TREATMENT OF ALEWIFE-PROCESSING WASTES (0.8)(9.19)

Borchardt, Jack A., and Fred G. Pohland (Dep. Civ. Eng., Univ. Michigan, Ann Arbor, Mich.)
Chemical Abstracts 74, No. 22, 115643g (May 31, 1971)

6.195 THE AVAILABILITY OF AMINO ACIDS IN FISH MEALS

Carpenter, K. J. (University of Cambridge, Cambridge, England)
Feedstuffs 43, No. 32, 31-32 (August 7, 1971)

The author discusses the interpretation of results from various assay methods for the availability of amino acids in feedstuffs. It is clear, the author states, from the evidence in the literature that, while meat-and-bone meals seem correctly placed with a relative [amino acid] availability of 90%, there is no reason to assign a lower factor for fish meals than that of soya meal [certain researchers assign values of 98% to both corn and soya meals]. Therefore the [amino acid] availability factor for fish meals should be reset to 100% relative availability.
[3 tables, 16 references] FTP

6.195 EFFECTS OF ZINC BACITRACIN, DRIED BAKERY PRODUCT AND DIFFERENT FISH MEALS IN DIETS OF YOUNG TURKEYS

Potter, L. M., J. R. Shelton, and M. Kelly (Department of Poultry Science, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061)
Poultry Science 50, No. 4, 1109-1115 (July 1971)

Two experiments were carried out to determine the effects of adding zinc bacitracin, dried bakery product, and various fish meals to diets of young (Medium White) turkeys on their body weights, feed consumptions, and feed efficiencies from 1 day to 8 weeks of age. A total of 864 turkeys (in 96 pens) was involved in the tests. Both tests were begun in late 1968.

When 11 or 28 milligrams of bacitracin (from zinc bacitracin) per kilogram of diet was added to diets fed to turkeys, the 8-week body weights of the turkeys increased significantly by 4.9 and 5.3% and feed efficiencies increased significantly by 1.9 and 2.0%, respectively. These data indicate, the author states, that antibiotics are still effective in increasing body weights and feed efficiencies of turkeys under 1968 conditions.

When 10% dried bakery product was added to diets fed turkeys in place of equal amounts of yellow corn, the 8-week body weights of the turkeys were unchanged, feed consumption decreased significantly by 2.7%, and feed efficiency increased significantly by 2.9%.

When 5% menhaden, anchovie, or herring fish meal with 3% ground yellow corn was added to the diet of turkeys in place of 7.3% dehulled soybean meal and 0.7% defluorinated phosphate, body weight of the turkeys increased significantly by 8.7%, feed consumption increased significantly by 4.2%, and feed efficiency increased significantly by 4.5%.
[1 figure, 4 tables, 26 references] FTP

6.190

respectively; and of those fed diets containing corn, barley, wheat, and milo were 3092, 3044, 3051, and 3127 grams and 0.2347, 0.2222, 0.2273, and 0.2378, respectively. The average feed efficiency of the turkeys fed diets containing barley or wheat was significantly less than those of turkeys fed diets containing milo or corn. The other differences (listed in this paragraph) among the body weights and feed efficiencies were not significant.

The relative feeding values of barley, wheat, milo, and corn were 86.5, 94.3, 97.9, and 100.0.
[9 tables, 16 references] FTP

4.92 (1.23)

supplemented soybean oil fatty acids as the primary source of nonprotein energy. Only the chicks on the menhaden-oil diet did poorly, even though the basal ration contained vitamins A and E and an antioxidant. Believing that the high mortality might by caused by oxidation of the lipid in the feed, the authors stored all the feed in a refrigerator and fed only fresh refrigerated feed daily during experiment 2. Although this treatment reduced the mortality rate, especially among chicks on the menhaden diet, the birds on the carbohydrate-free diets still did not grow as well as those on the control diet.

The total carcass composition of all the chicks except those fed menhaden oil was essentially the same; however, the fatty acid composition of the total carcass lipids reflected the fatty acid composition of the oils in the diets. Corn oil and linseed oil increased the levels of linoleic and linolenic acid and reduced the total quantity of saturated fatty acids.

Effect of menhaden oil and control diets on chick body composition

Constituent	Whole carcass		Adipose tissue		Liver		Muscle	
	M	C	M	C	M	C	M	C
	%	%	%	%	%	%	%	%
Protein (SEM ±0.60)	18.4	20.4						
Moisture (SEM ±1.65)	74.2	70.4						
Ash (SEM ±0.09)	3.4	2.9						
Lipid (SEM ±0.92)	3.4	5.1	25.1	49.0	5.0	3.2	3.9	3.5
Saturated	47.3	33.8	39.3	31.1	54.1	42.4	43.2	30.4
Unsaturated	52.2	66.2	57.6	69.2	46.1	57.1	55.6	69.2

SEM - pooled standard error of the mean
M - menhaden oil diet; C - control diet (Glucose monohydrate + 4% corn oil)
[7 tables, 11 references] LB

6.195 PERFORMANCE OF COMMERCIAL BROILER GENOTYPES ON FISH MEAL DIETS WITH A CHARCOAL SUPPLEMENT

Proudfoot, F. G., W. F. Lamoreux, and J. R. Aitken (Research Station, Canada Department of Agriculture, Kentville, Nova Scotia, Canada)
Poultry Science 50, No. 4, 1124-1130 (July 1971)

Two experiments were carried out to determine the effect of fish meal diets with a charcoal supplement on the growth response of broilers. The experiments involved 8,800 chicks of four commercial genotypes. White fish meal was used in the tests because it is higher in minerals than are meals from most other types of fish.

When the level of white fish meal was increased from 4% to 10% (at the expense of soybean meal) in the diet of the chicks, a significant positive growth response resulted; the response was not further affected by a further increase in level to 15%. Twenty percent fish meal in the diet resulted in lower weights of the chicks at 63 days of age in both experiments and a significantly higher mortality in one experiment. A high-fat fish meal fed at the 15% level of the diet resulted in the highest growth response in the first experiment, but this result was not repeated in the second experiment.

When six finisher diets were supplemented with activated charcoal 21 days before the broilers were slaughtered, the broilers showed increased growth and increased proportion of Grade A carcass, resulting in increased monetary gain (assuming charcoal costs the same as regular feed costs).
[6 tables, 9 references] FTP

6.37 THE SEA AS A FOOD SUPPLIER

Korringa, P.
Chemisch Weekblad 66, No. 36, 23-30 (1970) (In Dutch)
Food Science and Technology Abstracts 3, No. 3, 3R97, 500 (March 1971)

The primary production of the oceans (represented by green plants), its relation to the food chain, and the possibilities of its use for human and animal nutrition are discussed. [6 references] Extractor: LB

COMMERCIAL FISHERIES ABSTRACTS VOL. 24 NO. 12 PAGE 15

6.39 INDUSTRIAL EXTRACTION OF MANNITOL FROM PHAEOPHYCEAE

Caraes, Anne (Soc. Nourylande, Venette, France)
Chemical Abstracts 74, No. 7, 28861h (February 15, 1971)

6.54 (9.19)(7.42) MERCURY IN SELECTED FISH PROTEIN CONCENTRATES

Beasley, Thomas M. (Environmental Sciences Branch, Division of Biology and Medicine, Atomic Energy Commission, Washington, D.C. 20545)
Environmental Science & Technology 5, No. 7, 634-635 (July 1971)

Previous measurements of radionuclides in fish protein concentrate (FPC) have shown that radioactivity increases with each progressive step in the water-to-fish-to-concentrate progression. The assumption then is that the concentration of trace elements will also increase as fish are converted to FPC. To determine whether or not the accumulation of mercury in FPC is significant, the author examined samples of FPC made from fish caught on six U.S. fishing grounds between November 1968 and June 1969. The findings are tabulated below.

Fish used in the processing of the FPC		Hg content of FPC
Species	Site of catch	(µg. Hg/g. dry FPC, ±5%)
Menhaden (Brevoortia tyrannus)	Chesapeake Bay	0.34
Ocean pout (Macrozoarces americanus)	Massachusetts coast	0.42
Anchovy (Engraulis mordax)	California coast	0.44
Gulf menhaden (Brevoortia patronus)	Mississippi coast	0.51
Atlantic herring (Clupea harengus harengus)	Massachusetts coast	0.60
Alewife (Alosa pseudoharengus)	Lake Michigan	0.90

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 24 NO 12 PAGE 15

6.55 (1.81) THE CALCIUM REQUIREMENTS OF LAYING HENS AND EFFECTS OF DIETARY OYSTER SHELL UPON EGG SHELL QUALITY

Scott, M. L., S. J. Hull, and P. A. Mullenhoff (Department of Poultry Science, Cornell University, Ithaca, N.Y. 14850)
Poultry Science 50, No. 4, 1055-1063 (July 1971)

A level of 2.75% calcium in the diet of laying hens was recommended in the fifth revised edition of the Nutrient Requirements of Poultry [National Academy of Sciences--National Research Council (1966) Publication 1345, Washington, D.C.].

The purpose of the present study was (1) to reevaluate the calcium requirements of laying hens in relation to feed consumption and egg production and (2), having established the maximum shell thickness which could be achieved by supplementation of the complete laying ration with graded levels of pulverized limestone [determined in the first part of this study], to determine if it is possible to further improve egg shell quality by substitution of hen-size oyster shell for part or all of the pulverized limestone in the complete laying ration.

Single Comb White Leghorn hens were used in these tests. The hens were maintained in cages in an electrically heated laying house (the temperature was not allowed to drop below 65° F.). Feed and water were available to the hens at all times. The diets were formulated to contain 2.5, 3.0, 3.5, 4.0, 4.5, and 5.0% calcium.

When pulverized limestone is used as the only calcium supplement in a complete laying mash for hens, maximum production of eggs and quality of egg shell are attained when the diet contains 3.5% calcium. At 2.5% calcium level in the diet of

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. 24 NO. 12 PAGE 15

6.54 (9.19)(7.42)

Except for the mercury concentration in FPC made from Lake Michigan fish (possibly attributable to the unusual amounts of mercury from industrial sources concentrated in the lower Great Lakes area), that in the other fish was relatively uniform. Robertson (1970) noted the same uniformity in the mercury content of Atlantic, Pacific, and Mediterranean surface waters, a content that amounted to about 0.1 μg. Hg/liter. If the accumulation factor for mercury in fishes is 10^3, as proposed by Johnels and Westermark in 1969, the wet weight concentration of mercury in surface-feeding fish would be about 0.1 p.p.m. And if the concentration factor during FPC preparation is about 5, as proposed by Brown in 1970, then mercury concentration in the final product would be about 0.5 p.p.m. The agreement between this theoretical value and the observed values tabulated above validates the assumption that mercury is not removed during the FPC manufacturing process.

In 1969, Berglund and Berlin proposed a "temporary allowable daily mercury intake" of 60 μg. This limit would take into account not only the specific concentration of mercury in a given food but the estimated amount of that food that is eaten. Assuming the daily dietary intake of mercury by an adult is from 5 to 20 μg. (Bowen, 1966) and the daily intake of FPC is from 10 to 30 g., the author notes that none of the products he tested would contribute enough mercury to the diet to cause the total mercury intake to exceed the limits recommended by Berglund and Berlin.
[1 table, 12 references] LB

6.55 (1.81)

the hens, the amount of calcium supplied was inadequate and caused an increase in feed consumption and a decrease in the quality of the egg shell. At 5.0% calcium level in the diet, the amount of calcium supplied was excessive and caused a decrease in feed consumption and a decrease in egg production, and did not improve the quality of the egg shell above that obtained with 3.5% calcium in the diet.

Substitution of hen-size oyster shell for two-thirds of the pulverized limestone usually present in complete laying rations produced an improvement in the average strength of the egg shell, and this result appeared to be due to a constant metering of calcium from the gizzard into the blood stream of the hens.
[2 figures, 6 tables, 16 references] FTP

6.59 SEARCH FOR METHODS FOR REMOVING UREA FROM SHARK MEAT
(1.70)

Skachkov, V. P. (U.S.S.R.)
Chemical Abstracts 73, No. 21, 108348r (November 23, 1970)

6.199 UREA TOLERANCE IN GROWING AND ADULT CHICKENS
(1.71)

March, B. E., and Jacob Biely (Department of Poultry Science, The University of British Columbia, Vancouver 8, British Columbia, Canada)
Poultry Science 50, No. 4, 1077-1080 (July 1971)

Dogfish (Squalus suckleyi) meal contains about 2.5% urea, more or less depending upon the method of manufacture. Chickens are not able to use urea as a source of nitrogen. The purpose of the present study was to find out if urea had any deleterious effects when fed to growing or adult chickens.

In the first experiment, urea was fed to chicks from 1 day old to 8 weeks of age at dietary levels of 1 and 2%. The response of the chicks to the urea was tested using four basal diets containing 20, 22, 24, and 26% protein and 2,850, 2,950, 3,050, and 3,150 kcal. metabolizable energy per kg., respectively. Urea depressed growth of the chicks fed 20, 22, and 24% of protein, but had no effect on chicks fed 26% protein. Those chicks fed 2% urea consumed 20% (on the average) more water than did the chicks on the control diet (containing no added urea). Serum uric acid levels increased in the chicks fed urea, but mortality was not affected.

In the second experiment, urea was fed to laying pullets during a period of 16 weeks at dietary levels of 0.5 and 1.0%. The basal diet of the pullets was a practical laying ration containing 16% protein. Including urea (at the 0.5 and 1.0% levels) in the diet of laying pullets did not affect the rate of egg production, the size of the eggs produced, or the interior quality and shell thickness of the eggs. [3 tables, 13 references] FTP

6.55 DIGESTION OF CONCENTRATES IN SHEEP. 2. THE EFFECT OF UREA OR FISH-MEAL SUPPLEMENTATION OF BARLEY DIETS ON THE APPARENT DIGESTION OF PROTEIN, FAT, STARCH AND ASH IN THE RUMEN, THE SMALL INTESTINE AND THE LARGE INTESTINE, AND CALCULATION OF VOLATILE FATTY ACID PRODUCTION

Ørskov, E. R., C. Fraser, and I. McDonald (Rowett Research Institute, Bucksburn, Aberdeen AB2 9SB)
British Journal of Nutrition 25, No. 2, 243-252 (March 1971)

Four sheep with cannulas in the abomasum and in the terminal ileum were fed diets of rolled barley supplemented at four different levels with either urea or fish meal. The disappearance of protein, ether extractives, starch, and ash in the various parts of the alimentary canal was calculated, and the production of volatile fatty acids was estimated for the period when urea was fed. Nonammonia crude protein (NACP) disappeared increasingly from the small intestine as the intake of protein from the fishmeal diet increased ($Y = 0.37X + 44$, where Y is the disappearance of NACP in grams/day and X is the protein intake in grams/day). The disappearance of NACP did not increase when urea was the dietary supplement. The excretion of fecal N was influenced appreciably more by fermentation in the large intestine than by that in the rumen. Apparently ether-extractable lipid was synthesized at the rate of 18 g./day when the fishmeal diets were fed; at the rate of 21 g./day when urea was fed. The finding that the mean value of all volatile fatty acids produced was equal to 59% of the digestible energy of the diets agrees with other investigators' estimates obtained by the isotope dilution procedure.
[7 tables, 21 references] LB

7.42 (9.19)(7.89) RAPID DETERMINATION OF MERCURY IN FISH

Bache, Carl A. (Pesticide Residue Laboratory, Cornell University, Ithaca, N.Y. 14850), Colin McKone (Weed Research Organization, Agricultural Research Council, Begbroke Hill, Savoy Lane, Yarton, Oxford, England), and Donald J. Lisk
Journal of the Association of Official Analytical Chemists 54, No. 3, 741-743 (May 1971)

A convenient combustion-colorimetric method is described that is sufficiently sensitive to detect mercury residues in fish at the FDA-tolerated 0.5 p.p.m. limit. It involves modifications of the Schöniger method (which is satisfactory for fruits, vegetables, and other foods containing little fat or oil) to permit combustion of fish containing high concentrations of fat and oil. Those laboratories that do not have the equipment to analyze for mercury by the Hatch and Ott method (1968) of flameless atomic absorption spectrometry will find the proposed method particularly useful. [2 tables, 5 references] LB

7.42 DETERMINATION OF COPPER, IRON, AND ZINC FROM A SINGLE SMALL SAMPLE
Watkins, Ruth, Lawrence M. Weiner, and Bennie Zak (Detroit Gen. Hosp., Detroit, Mich.)
Chemical Abstracts 74, No. 23, 121179b (June 7, 1971)

7.45 (9.19)(7.599) GAS CHROMATOGRAPHIC DETERMINATION OF ORGANIC MERCURY COMPOUNDS BY EMISSION SPECTROMETRY IN A HELIUM PLASMA. APPLICATION TO THE ANALYSIS OF METHYLMERCURIC SALTS IN FISH

Bache, Carl A., and Donald J. Lisk (Pesticide Residue Laboratory, Department of Entomology, Cornell University, Ithaca, N.Y. 14850)
Analytical Chemistry 43, No. 7, 950-952 (June 1971)

In 1965, McCormack et al. reported development of a method whereby organic compounds containing sulfur, phosphorus, and halogens could be detected chromatographically by emission spectrometry in a microwave-powered inert-gas plasma. In investigations prior to the previous one, the present authors applied the method to analyses of pesticides in agricultural samples. In the present one, they extend the method to an analysis of methylmercuric chloride in Lake Erie coho salmon.

The instrument used was identical to the one they described in the report (1967) of the earlier investigation on pesticides in agricultural samples. However, a tuning device was used with the tapered matching cavity and 35.7 watts rather than 51 watts was applied to the plasma. The monochrometer wavelength was adjusted to isolate the 2537 Å atomic mercury line, and a Varian Aerograph (Model 705) gas chromatograph equipped with a ^{63}Ni electron affinity detector was used to confirm the analytical results. When no methylmercuric chloride was added to duplicate 10-g. samples of coho, the electron affinity detector and the emission spectrometric detector gave identical results (0.20 and 0.18 p.p.m.); when 0.17 p.p.m. methylmercuric chloride was added to the samples, average recovery was 0.32 and 0.295 p.p.m. for the two detectors, respectively. Average percent recovery was 71 and 62, respectively. These values agree with those of Westoo, whose method of analysis (reported in Acta Chem. Scand. 20, 2131 (1966) and 21, 1790 (1967))

(over)

7.45 (9.19) (7.599) RADIOCHROMATOGRAPHIC ASSAY FOR THIOL GROUPS OF SOLUBLE PROTEINS USING MERCURY-203 LABELED METHYLMERCURY

Cullen, M. C., and E. T. McGuinness (Department of Chemistry, Seton Hall University, South Orange, N.J. 07079)
Analytical Biochemistry 42, No. 2, 455-469 (August 1971)

Incidents of alkyl mercury poisoning have occurred either from the use of organomercurials as seed dressing and fungicides or from the anaerobic generation of methylmercury by methanogenic microorganisms in the bottom sediments of lakes and rivers. (These aquatic organisms convert the inorganic mercury discharged by pulp, paper, and chlorine industries to environment-contaminating methylmercury.) Thus organomercurial poisoning can arise from either the aquatic or the terrestrial food chain. In animal foodstuffs, methylmercury is probably largely attached to thiol groups. In view of the reported extent of alkyl mercury poisoning, then, a sensitive method for thiol group assay becomes increasingly important.

The authors have developed an automated method for continuously monitoring $^{203}Hg(II)$, $[^{203}Hg]CH_3Hg^+$, and [^{203}Hg]methylmercuri-labeled proteins in an aqueous system. $[^{203}Hg]CH_3HgNO_3$ is used to react with the protein or thiol-bearing group; excess reagent is separated from the labeled thiol-containing material. Then, at the same time, analysis is carried out by placing the reaction mixture on a gel permeation column and continuously monitoring the β radiation of the effluent in an anthracene-packed flow cell mounted in a liquid scintillation counter (or the γ radiation of the nuclide in a sodium-iodide well-type scintillation counter). The cationic surfactant Hyamine 2389 causes either no retention or a marked attenuation of mercury or methylmercury and methylmercury-labeled proteins on anthracene.

(over)

7.461 (9.19)(7.89) COMBINED GAS CHROMATOGRAPHY-MASS SPECTROMETRY OF MULTIPLE CHLORINATED PESTICIDE RESIDUES IN FOODS

Bellman, Sander W., and Thomas L. Barry (Food and Drug Administration, 850 Third Ave., Brooklyn, N.Y. 11232)
Journal of the Association of Official Analytical Chemists 54, No. 3, 499-506 (May 1971)

Described is a system for rapidly identifying multiple chlorinated pesticide residues in foods and for positively distinguishing and removing those polychlorinated biphenyls (PCB) that tend to interfere with the analysis. Using a mass spectrometer (MS) coupled directly to a gas-liquid chromatograph (GLC), the authors identified p,p′-DDE in cheese and several isomers of HCH (1,2,3,4,5,6-hexachlorocyclohexane) in cocoa beans and frog legs, and they demonstrated the removal of PCB components from under the p,p′-DDE and p,p′-DDT peaks in the chromatograms of fresh and smoked chub. In demonstrating the technique, they show that the 6% ether eluates of some products prepared by conventional FDA "Pesticide Analytical Manual" procedures for fatty and nonfatty foods are suitable for direct GLC-MS analysis, without further cleanup. However, further cleanup is necessary for the 15% ether eluates prepared by the fatty food procedure. They were able to obtain identifiable mass spectra on standard p,p′-DDE amounting to as little as 0.04 µg., but in actual injected samples, such spectra required 0.3 µg. p,p′-DDE, equivalent to 0.1 p.p.m. in fatty foods.
[7 figures, 16 references] LB

7.45 (9.19)(7.599)

was used during the investigation. He found that, due to unfavorable partition coefficients, about 30% of the methylmercuric salts is lost during the procedure.

The emission detector discussed here is the only selective gas chromatographic detector the authors are aware of for analyzing mercury compounds. They estimate that its sensitivity for methylmercuric chloride in fish is from 0.05 to 0.1 p.p.m., depending on the control value The essential lack of hydrocarbon emission in the 2537 Å region probably accounts for the selectivity. The selectivity ratio of the 2537 Å atomic emission line for mercury when methylmercuric chloride is compared to eicosane is at least 10,000:1; the detector responds linearly from 0.1 to at least 100 ng. of injected methylmercuric chloride. Although low-pressure helium plasma was used during these analyses, argon plasma can be used equally well for mercury analysis.

[1 figure, 3 tables, 38 references] LB

7.45 A SIMPLIFIED METHOD FOR DETERMINING NITRATES IN FOOD

Westcott, C. C. (Beckman Instruments, Inc., 2500 Harbor Blvd., Fullerton, Calif. 92634)
Food Technology 25, No. 7, 49-50 (July 1971)

The current methods for determining nitrates in foods are time consuming, or lack selectivity, or are not sufficiently sensitive. A new method is available that is simple, fast, and inexpensive. It has been used previously for determining nitrates in water, plants, and certain foods. The method involves the use of ion-selective electrodes equipped with ion-exchange membranes and is described in detail by C. Wescott and F. Perlman ["Nitrate in Foods. Application Data Sheet EC-0102," Beckman Instruments, Inc., Fullerton, Calif.].

[2 figures, 2 tables, 8 references] FTP

7.461 (9.3)(7.89) (0.1) COLLABORATIVE STUDY OF THE USE OF A CONVENIENT SALT MEASURING TITRATOR FOR MONITORING SALT CONCENTRATION IN MEAT, FISH, AND CHEESE

Vander Werf, Loren J., and Alfred H. Free (Ames Co., Division of Miles Laboratories, Inc., Elkhart, Ind. 46514)
Journal of the Association of Official Analytical Chemists 54, No. 3, 587-589 (May 1971)

Twelve collaborators were given aliquots of the same specimens of meat (pork-beef weiners and roast beef), fish (canned tuna and canned sardines), and cheese (cheddar and blue), along with QUANTAB No. 1176 titrators, and asked to take duplicate measurements of the salt concentration in each food product. Because of the good agreement of results from all the collaborators on all the samples, the method has been adopted as a procedure. The procedure requires a minimum of training, experience, and sample-preparation time.

The QUANTAB Chloride Titrator is a thin, chemically inert, plastic strip about 0.5 x 3.5 inches. It is laminated with an absorbent-paper capillary column impregnated with brown $Ag_2Cr_2O_7$. When the strip is placed in an aqueous solution, fluid rises in the column by capillary action; it continues to rise as long as any chloride enters the column. The entering chloride reacts with the silver in the column to produce a white color change in the insoluble AgCl. When the column is completely saturated, a moisture-sensitive indicator across its top turns dark blue, showing that titration is complete. The length of the white color in the column is proportional to the chloride concentration in the test solution--the scale number at the tip of the white color change being read off and converted to percent of salt by reference to a calibration table accompanying the titrator.

[1 table, 7 references] LB

7.461 (9.19)(7.89) COLLABORATIVE STUDY OF A METHOD FOR MULTIPLE CHLORINATED PESTICIDE RESIDUES IN FISH

Carr, Richard L. (Food and Drug Administration, 1141 Central Parkway, Cincinnati, Ohio 45202)
Journal of the Association of Official Analytical Chemists 54, No. 3, 525-527 (May 1971)

Eight laboratories collaborated in the development of a method (later adopted as official first action) for determining chlorinated pesticide residues in fish. Using one sample of silver salmon and two samples of rainbow trout--two of the samples being fortified with each of six pesticides at two levels--they quantitatively measured pesticide residues by electron capture gas-liquid chromatography. Then they confirmed the measurements by thin-layer chromatography, using aluminum oxide as the coating and n-heptane as the developing solvent. Percent recovery of each pesticide is shown in the table below. (A and B are the fortified samples; C, not shown, was used by the author to evaluate the precision of the submitted measurements.)

Pesticide	Percent recovery		
	A	B	Average
α-BHC (1,2,4/3,5,6-hexachlorocyclohexane)	97.1	87.3	92.2±14.9
Heptachlor epoxide	93.1	90.2	91.6±8.8
p,p′-DDE (1,1-dichloro,2,2-bis (p-chlorophenyl)ethylene)	88.5	86.6	87.5±13.5
p,p′-TDE (1,1-dichloro-2,2-bis(p-chlorophenyl)ethane)	90.0	87.3	88.6±11.4
p,p′-DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane)	91.2	90.0	90.6±9.7
dieldrin	85.0	79.3	82.2±25.4

[3 tables, 5 references] LB

7.45 (9.19)(7.599)

Using ribonuclease and bovine serum albumin as the test proteins, the authors were able to rapidly and reproducibly assay between 10^{-6} and 10^{-9} mole of protein when the specific activity of the working mercurial solution was held to between 13 and 35 μCi/mmole. They consider the method to be sufficiently sensitive to serve as a basis for the radiochemical determination of Hg(II) and CH_3Hg^+ in environmental water and in foodstuffs.

[5 figures, 4 tables, 40 references] LB

7.51 MUSCLE PROTEIN IN MEAT PRODUCTS (7.89)

Langner, H. J.
Fleischwirtschaft 50, 1391 (1970)
Food Manufacture 46, No. 7, 74 (July 1971)

A simple, rapid method is described for determining muscle protein, the factor that governs the value of meat products. First, meat samples are treated with a mixture of dichloromethane and acetone to remove the water and fat; then the residue is heated with a 0.1 M Na_2HPO_4 buffer to isolate the muscle protein. The method is particularly suitable for meat products that have been heated to high temperatures, but it is also useful for sausage-type products if they are first heated to about 115° C. for 1 hr. The standard deviation of the method is ±0.32.

LB

7.49 (9.19) MODEL ECOSYSTEM FOR THE EVALUATION OF PESTICIDE BIODEGRADABILITY AND ECOLOGICAL MAGNIFICATION

Metcalf, Robert L., Gurcharan K. Sangha, and Inder P. Kapoor (Departments of Zoology and Entomology, University of Illinois, Urbana-Champaign, Ill. 61801)
Environmental Science & Technology 5, No. 8, 709-713 (August 1971)

The threat of long-range, virtually irreversible, environmental pollution by such stable lipid-partitioning substances as DDT, dieldrin, PBC, and dimethyl mercury has demonstrated the folly of learning about pesticidal behavior only through decades of wide-scale use. Some realistic laboratory method is needed for screening the environmental effect of proposed new pesticides. The method described in this report uses radiolabeled compounds in a model ecosystem to provide both qualitative and quantitative data about the metabolism of the compounds in both plants and animals.

The basic units of the model system are a glass aquarium containing white quartz sand molded into a sloping soil-air-water interface and a seven-link food chain: (1) sorghum (Sorghum halpense) --> larvae of salt marsh caterpillar (Estigmene acrea); (2) caterpillar excreta --> alga (Oegodonium cardiacum); (3) alga --> snail (Physa); (4) caterpillar excreta --> diatoms (including Navicula, Coscinodiscus, Diploness, and Diatomella); (5) diatoms --> plankton (including Daphnia, Nuclearia, Coleps, Vorticella, Paramecium, Asplanchnopus, Notomatta, Euclaris, and Scardium); (6) plankton --> mosquito larvae (Culex pipiens quinquefasciatus); (7) mosquito larvae and water fleas (Daphnia magna) --> mosquito fish (Gambusia affinia). The system begins working when the sorghum, which has been planted at the terrestrial end of the aquarium, reaches about 4 in. in height. At that time, the

(over)

7.52 (0.7) SOME FACTORS AFFECTING THE BIOLOGICAL AVAILABILITY OF AMINO ACIDS IN FISH PROTEIN

Soares, Joseph H., Jr., David Miller, Norman Fitz, and Marion Sanders (National Center for Fish Protein Concentrate, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, College Park, Md. 20740)
Poultry Science 50, No. 4, 1134-1143 (July 1971)

Three series of experiments were carried out to determine (1) the availability of amino acids in various fish proteins when germ-free chicks and environment are used as the test conditions, (2) the effect of method of preparation of fish protein materials on the amino-acid digestibility of their proteins, and (3) the effects of low levels of dietary chloride and sulfate anions on the digestibility of amino acids in gnotobiotic chicks.

Gnotobiotic chicks consistently excreted less amino acids per gram of feces than conventional chicks do. Chicks that were fed a poor-quality herring fish meal consistently excreted more amino acids than do chicks fed a good-quality herring fish meal, regardless of the environmental conditions. However, the differences in amino-acid digestibilities between the poor and the good fish meals for the chicks held in a germ-free environment were more significant than were those for chicks held in a conventional environment.

Little or no difference in amino-acid digestibility was found when a low chloride and sulfate mineral supplement or when the conventional mineral premix was added to the diets of germ-free chicks.

Fish protein concentrate (prepared from menhaden and processed by the isopropyl alcohol extraction method) and menhaden fish meal (defatted with hexane) showed

(over)

7.49 (9.19) A BIODEGRADABILITY TEST FOR INSECTICIDES

Halvorson, Harvest, and M. Ishaque (Department of Microbiology, University of Manitoba, Winnipeg, Canada), and J. Solomon and O. W. Grussendorf (Research Station, Canada Department of Agriculture, Winnipeg, Manitoba)
Canadian Journal of Microbiology 17, No. 5, 585-591 (May 1971)

The authors suggest that bacteria from a sewage lagoon can be used to determine the persistance of newly developed insecticides. The method is based on experimental results showing that the organophosphates malathion, parathion, and diazinon are metabolized quickly by resting cell suspensions of these bacteria, whereas the chlorinated hydrocarbons heptachlor, dieldrin, and DDT are metabolized poorly or not at all; oxygen is an insignificant factor in the catabolic process. The advantages of using resting cell suspensions of sewage lagoon bacteria rather than of using normal field trial methods include the speed of discovering the recalcitrant nature of a chemical (hours rather than weeks or months are required); the ease of determinating degradation rate reactions of closely related compounds or the effects of structural modifications to a parent compound; the ready detection of acclimation or adaptation initiating use, or the repression of use, by other compounds; the facility of determining the effects of physical and chemical parameters on metabolism; the permissibility of adding several insecticides simultaneously to the same resting cell suspension, minimizing technical demands; and, in contrast with the requirements of pesticide analysis by gas chromatography, the absence of any need for cleanup pretreatment to remove interfering organic contaminants. [2 figures, 4 tables, 31 references] LB

7.80 (3.237) COLLABORATIVE STUDY OF A METHOD FOR DETERMINING THE FISH FLESH CONTENT OF FROZEN BREADED FISH PRODUCTS

Werren, John C., and Frank H. Allhands, Jr. (Division of Food Chemistry and Technology, Food and Drug Administration, Washington, D.C. 20204)
Journal of the Association of Official Analytical Chemists 54, No. 3, 640-642 (May 1971)

Voluntary U.S. Grade Standards for breaded fish products specify not only the minimum amount of fish flesh that must be present in the product but the method to be used in determining that amount. However, because the batters used on some precooked products are difficult to remove under the limitations specified in present procedures (water bath 63° to 86° F. and dip time 10 to 80 sec.), the authors attempted to find more satisfactory inspection criteria. Their preliminary laboratory results indicated that precooked frozen fish products could be debreaded in from 5 to 20 sec. without unfreezing the fish if a water bath of 120° F. were used.

Eight laboratories were called on to test the new limits. Each laboratory was sent one carton of each of four types of frozen, breaded fish product, 16 sticks or portions to a carton, and asked to determine the amount of fish flesh each product contained. Six units from each carton could be used to determine dip time; the other ten were to be analyzed for fish content, a water bath of from 110° to 120° F. being used on the precooked units and of from 63° to 75° F. on the raw units. Characteristics of the four types of products and results of the collaborative analysis are shown on the back of the card.

(over)

7.80 (6.19) PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS

Gehrt, Albert J. (Moorman Mfg. Co., 1000 N. 30th St., Quincy, Ill. 62301)
Journal of the Association of Official Analytical Chemists 54, No. 3, 669-680 (May 1971)

The official method for pepsin digestibility of animal proteins has been widely used since 1959 for evaluating the quality of meat meal, meat and bone meal, digester tankage, fish meal, blood meal, whale meal, poultry-byproduct meal, and hydrolyzed poultry feathers. It involves overnight digestion of the defatted sample with pepsin and determination of the indigestible residue by centrifuging, washing, drying, and weighing. Because isolation of the indigestible residue by centrifuging not only is slow and laborious but also tends to lose part of the residue during decantation, several laboratories have investigated isolation by filtration. They have found that the indigestible residue can be readily filtered through glass-fiber paper (with no decantation loss) in a California modified Büchner funnel and determined by washing, drying, and weighing.

Agreement between 25 collaborators who studied the modified method was satisfactory for all samples except poultry-byproduct meal and hydrolyzed feathers; standard deviations ranged from 0.43 to 1.07. The modified method has been adopted as official first action for evaluating the quality of all animal proteins except poultry-byproduct meal and hydrolyzed feathers. The basic digestion conditions of the official method remain unchanged.
[5 tables, 2 references] LB

7.80 (3.237)

Sample	Type of frozen, breaded fish product	Av. fish content	Standard deviation		Coeff. of var.
		percent	between labs.	within sample	between labs.
A	1-oz. raw sticks	74.2	0.63	2.37	0.85
B	2.5-oz. raw portions	74.7	0.63	2.37	0.85
C	1-oz. precooked sticks	63.0	2.62	1.68	4.16
D	2.5-oz. precooked portions	67.5	0.70	1.77	1.04

Except for Sample C, the standard deviation and the coefficient of variation between collaborating laboratories was not significantly different at the $p < 0.01$ levels. The problem with the analyses of this sample was traced to the long dip times (ranging from 25 to 57 sec.) used by four of the eight collaborators. To solve the problem, the authors recommended that the following be added to the method of determining fish content of frozen breaded fish products: "Limit dip time in >100° F H_2O to 15 sec max." The recommendation was approved and the method has been adopted as official first action.
[3 tables] LB

7.8 EVALUATION OF THE FITNESS FOR CONSUMPTION OF FISH AND SOME FISH PRODUCTS

Wierzchowski, Jozef (Dep. Food Sci., Med. Acad., Gdansk, Poland)
Chemical Abstracts 75, No. 5, 33983z (August 2, 1971)

7.49 (9.19)

leaves are treated with a radio-labeled pesticide (either 5.0 mg. of ^{14}C-labeled DDT or ^{3}H-labeled methoxychlor) at a rate equivalent to the 1 lb./acre commonly used in pesticide applications. Samples of the sand and the water are tested 1, 3, 7, 14, and 28 days after the sorghum is treated; weighed samples of the organisms after 33 days.

Over the past 2 years, the authors have evaluated about a dozen insecticides in the model ecosystem. In this paper, they report results obtained from evaluations of DDT and its derivatives (which are persistent and essentially nonbiodegradable) and of methoxychlor (which is persistent and biodegradable). Duplicate tests showed that the DDT is concentrated and stored as DDE, DDD, and DDT in the tissues of the fish, snails, and mosquito larvae at a rate of from 10,000 to 100,000 times that in the water. Most of the pure p,p′-DDT is converted to p,p′-DDE; at the end of the test, 52% of the radioactivity in the snails, 58% in the mosquito larvae, and 54% in the fish was DDE; it was concentrated from 30,000- to 50,000-fold and stored with little metabolism. In contrast, ^{3}H-methoxychlor was readily metabolized to mono- and di-OH derivatives and was stored at relatively low levels, the amount being about 0.01 that of DDT.

These 30-day results are quite similar to those reported after some 20 years' study of the Lake Michigan ecosystem. Moreover, they show rather clearly the metabolic and degradative pathways that produce ecosystem phenomena. Since the model system is especially suited to computer modeling and to studies of the effects of small changes in molecular properties on environmental biodegradability, and since it gives a good and rapid estimation of the potential toxicity of the degradation products of a pesticide to a variety of organisms, the authors conclude that it is a useful method of screening the effects on the environment of candidate pesticides
[2 figures, 3 tables, 12 references] LB

7.52 (0.7)

significantly higher amino acid-availabilities in the germ-free chicks than did conventional menhaden fish meal.
[9 tables, 25 references] FTP

7.8 TECHNIQUES IN THE SENSORY ANALYSIS OF FLAVOURS

Spencer, H. W. (Lyons Central Laboratories, 149 Hammersmith Road, London W.14, England)
Flavor Industry 2, No. 5, 293-296, 297-300, 301-302 (May 1971)

Flavor is regarded as a combination of the responses of an individual to the sensations of taste, smell, and mouth-feel. Standardization of methods of sensory analysis has not been accomplished mainly because the subject incorporates a number of scientific disciplines. Successful sensory analysis requires the preliminary selection and training of judges; test procedures involve the use of laboratory panels of trained judges. This paper discusses the application of various test procedures and the correlation between sensory and instrumental analysis. The paper included the following sections: (1) Review of sensory techniques, (2) Recommended conditions of testing, (3) The formation of a flavor panel in the author's laboratory, (4) Results obtained by the panel and correlation between sensory tests, and (5) Examples of instrumental and sensory correlation.
[18 figures, 1 table, 19 references] FTP

7.85 ADENOSINETRIPHOSPHATE (ATP) LEVELS IN FOODS CONTAMINATED BY BACTERIA

Sharpe, A. N., M. N. Woodrow, and A. K. Jackson (Unilever Research Laboratory, Colworth/Welwyn, Colworth House, Sharnbrook, Bedford, England)
Journal of Applied Bacteriology 33, No. 4, 758-767 (December 1970)

The usefulness of ATP as a means of detecting bacterial contamination in foods depends on the efficient separation of bacterial from nonbacterial ATP and on the relative levels of each. The authors therefore determined the ATP levels in a variety of microorganisms and foods, either as purchased, after incubation, or after addition of living bacteria. The object was to derive a better method of estimating biological contamination in food than the conventional plate-count method can give.

ATP found in some 50 products (including frozen plaice fillets and frozen fish fingers) was divided into intrinsic ATP--that is, ATP derived from the original tissue--and microbial ATP. During incubation, intrinsic ATP decreased whereas microbial ATP increased. At sufficiently high levels of contamination, the ATP levels correlated with bacterial concentrations, but the bacterial contribution to total ATP had to be as great as, or greater than, the intrinsic ATP for the result to be significant in terms of bacterial numbers. The authors suggest that a time/temperature value be determined for each product. Above that value, ATP values could be used to quickly give a reasonable estimate of bacterial contamination; below it, a conventional plate count would be necessary.

[5 tables, 7 references] LB

7.86 (3.236) COMPARATIVE EFFICIENCY OF TWO METHODS AND TWO PLATING MEDIA FOR ISOLATION OF STAPHYLOCOCCUS AUREUS FROM FOODS

Tardio, Joseph L. (Food and Drug Administration, 900 Madison Ave., Baltimore, Md. 21201), and Edward F. Baer (Division of Microbiology, Food and Drug Administration, Washington, D.C. 20204)
Journal of the Association of Official Analytical Chemists 54, No. 3, 728-731 (May 1971)

In 1967, the International Committee on Microbiological Specifications for Food assembled five worldwide methods that were judged to be effective for detecting and enumerating Staphyloccus aureus. One was the original AOAC official first action method of 1966. The committee published the five as interim methods, and suggested that they be subjected to interlaboratory testing. In the study reported here, the authors compared the efficiency of two of the methods--a direct plating method, in which Baird-Parker medium is used; and the current AOAC enrichment isolation method, in which trypticase soy broth containing 10% NaCl (TSBS) and Vogel and Johnson agar is used. Because Vogel and Johnson agar reportedly inhibits the growth of S. aureus, they also compared the efficiency of this agar with that of Baird-Parker as plating media for the AOAC method.

Relative efficiencies of the direct plating (DP) and the AOAC methods for isolating and detecting S. aureus are shown on the back of the card.

(over)

7.879 COLLABORATIVE STUDY OF A METHOD FOR THE DETERMINATION OF TRIMETHYLAMINE NITROGEN IN FISH

Boland, Frederick E., and Dorothy D. Paige (Division of Food Chemistry and Technology, Food and Drug Administration, Washington, D.C. 20204)
Journal of the Association of Official Analytical Chemists 54, No. 3, 725-727 (May 1971)

The Dyer method of determining trimethylamine nitrogen (TMA-N) in fish and fish products is widely accepted and readily adaptable to the routine analysis of large numbers of fish samples. The Canadian Government has recommended it as a useful indicator of the quality of fish, and the Codex Committee on Fish and Fishery Products has dubbed it a useful supplement to the sensory examination of quick-frozen cod and haddock fillets. To determine its accuracy and precision in routine analytical practice, nine collaborators used it to analyze six samples of fish extract and one standard solution of TMA. Except for the results from one collaborator (which differed so significantly that they were not included in the statistical analysis), all results generally agreed well, the acceptable and the decomposed samples being clearly differentiated. The method has been adopted as official first action.

[3 tables, 4 references] LB

7.9 ESTIMATING THE METABOLIZABLE ENERGY OF FOODSTUFFS WITH AN AVIAN MODEL

Squibb, Robert L. (Laboratories of Disease and Environmental Stress, Rutgers, The State University, New Brunswick, N.J. 08903)
Journal of Nutrition 101, No. 9, 1211-1215 (September 1971)

A modification is described for the standardization and simplification of present methods of determining metabolizable energy in foodstuffs. The growth of 9-day-old chicks is reduced to 40 to 60% of genetic potential by restricting the intake of a balanced 26% protein diet. A foodstuff(s), added to this diet, refuels the chicks' growth thrust to the limitations of the availability of added calories in the test ingredient. When calculated in terms of a basal reference group, the increased growth is a linear function which permits reading caloric values of a test material directly from a reference curve. Values of several common foodstuffs, determined by this method, agree with published metabolizable energy values.

[1 figure, 4 tables, 13 references] Author's abstract

7.86 (3.236)

Sample food	Number of positive samples	Number theoretically detectable	No. detected by DP	No. detected by AOAC	No. undetected by DP only	No. undetected by AOAC only	No. undetected by both
Crab meat	67	57	39	45	19	13	9
Crab cakes	25	25	20	20	2	2	3
Breaded shrimp	11	5	4	10	7	1	0
Total	103	87	63	75	28	16	12

The relative efficiency of Vogel and Johnson (VJ) agar and Baird-Parker (BP) medium for detecting S. aureus in food--with both media being used in the AOAC official first action method--is shown below.

Sample food	Number of positive samples	Number detected by VJ only	BP only	both	neither
Crab meat	62	2	19	39	2
Crab cakes	25	0	5	20	0
Total	87	2	24	59	2

[3 tables, 14 references]

[In a followup report ("Isolation and Enumeration of Staphylococcus aureus: Review and Recommendations for Revision of AOAC Method," ibid., pp. 732-735) containing 4 tables and 27 references, Baer recommends that instructions for preparing and using Vogel and Johnson agar be deleted from the subject method and those for Baird-Parker medium be substituted. The recommendation has been accepted.] LB

7.85 A COMPARATOR METHOD OF ASSESSING BACTERIAL PLATE COUNTS

Murphy, R. P., and C. G. Tucker (Research and Development Department, Irish Sugar Co. Ltd., Carlow, Eire)
Journal of Applied Bacteriology 33, No. 4, 641-648 (December 1970)

Most food bacteriological methods are based on methods used to examine milk and water, the total viable count of microorganisms being accepted as an index of both plant and product hygiene. Yet the plate-count method of determining total viable counts of bacteria in milk, food, and water is not only tedious, it gives results that are only ±25% accurate. With the method described here, the number of colonies on plates carrying up to 1,000 colonies can be counted with an accuracy of ±10%--the speed of examination is virtually unaffected by the number of colonies present.

Plate cultures prepared in the usual way are compared visually with a series of standards. The preparation of suitable standards and their arrangement and use are described. Although the skill of the operator largely determines the time saved by using this technique, the authors have found that from 3 to 6 matchings per minute are easily possible. With the plate-count method, about 20 actual counts per hour, with considerable eyestrain, is average when counts of 150 or more are involved.

[2 figures, 4 tables, 1 reference] LB

7.80 ADAPTABILITY OF CHEMICAL-ANALYTICAL METHODS FOR THE QUALITY ASSESSMENT OF FROZEN FISH (3.239)

Muenkner, W. (Inst. Hochseefis. Fischverarb., Rostock, Germany)
Chemical Abstracts 75, No. 5, 34023y (August 2, 1971)

7.84 DIELECTRIC MEASUREMENTS IN FOOD ANALYSIS

Kohn, R. M.
Fette und Seifen 72, 895 (1970)
Food Manufacture 46, No. 7, 74 (July 1971)

The applicability of using dielectric methods of measurement (that is, the determination of dielectric constants and dielectric losses) for analyzing certain food additives and fat-, protein-, and carbohydrate-containing foods is illustrated with fats and oils, mono- and diglycerides, meat, milk, fish, cheese, gelatin, potatoes, cereals, sugar, and jams. LB

7.9 FREEZING SPECIMENS

Balzers Patent und Beteiligungs-Aktiengesellschaft (FL-9496 Balzers, Liechtenstein) (pat.)
British Patent 1,230,120
Refrigeration and Air Conditioning 74, No. 88, 79 (July 1971)

Biological specimens that are to be examined by electron microscope are frozen under high pressure, the pressure being applied until the temperature of the specimen drops to -58° F. The patentee claims that this method of freezing specimens prevents damage to cell structure by ice crystallization. LB

7.86 COMPARATIVE EXAMINATIONS FOR THE EFFECTIVENESS OF MEDIA TO DETECT CLOSTRIDIA FROM CANNED MEAT PRODUCTS (3.30)

Takacs, J.
Arch. Lebensmittelhyg. 22, No. 5, 101-104 (1971) (In English)
BFMIRA Abstracts 24, No. 8, Abstract No. 2647, 545 (August 1971)

It was found that the best media for the recovery of Clostridia were Modified Cooked Meat Medium and Kitt-Tarozzi Liver Broth followed by Cooked Meat Medium according to Holman, semisolid Sulphite Agar, Diagnostic Reinforced Clostridial medium and semisolid Glucose Deep Agar, in that order. The composition, consistency of the media, and the incubation temperature greatly influenced the results. For the detection of Clostridia in routine work it was recommended that Modified Cooked Meat Medium or Liver Broth in combination with Sulphite Agar with the addition of 0.1% glucose should be used. C.S.B. Reprinted

7.89 EVALUATING THE QUALITY OF FROZEN FISH ACCORDING TO THE CONTENTS OF VOLATILE CARBONYL COMPOUNDS (8.8)(3.2493)

Altuf'eva, K. A., O. M. Sokolova, and V. N. Ushkalova (Sib NIIRKH, U.S.S.R.)
Rybnoe Khozyaistvo 46, No. 5, 64-66 (1970) (In Russian)
Food Science and Technology Abstracts 3, No. 3, 3R106, 501 (March 1971)

During storage of frozen fish, fat oxidizes and low-molecular-weight carbonyl compounds, which can be steam distilled, form. The content of these volatile substances is an important index in the assessment of the quality of the fish. Therefore the authors developed a photometric method of determining such content. Owing to the congruence of the spectra of these compounds with those of butyric acid aldehyde, whose maximum is at 280 nm., they use a solution of this aldehyde as a standard. Samples of tissue fat weighing between 0.02 and 0.04 g. are added to a 10% solution of sodium chloride, and the carbonyl compounds are distilled with water vapor. A defined volume of the distillate is then measured. The volatile compounds increase with storage time. Extractor: LB

8.51 (0.4) CHARACTERIZATION OF A MAJOR ALLERGEN (COD). OBSERVATIONS ON EFFECT OF DENATURATION ON THE ALLERGENIC ACTIVITY

Elsayed, S., and K. Aas (Pediatric Department and Pediatric Research Institute, Rikshospitalet University Hospital, University of Oslo, Norway)
Journal of Allergy 47, No. 5, 283-291 (May 1971)

An allergenically active protein, designated DS22, was isolated from the albumin of white cod muscle. Following denaturation by 8M urea/β-mercaptoethanol and high concentrations of guanidine hydrochloride, the DS22 was reduced by the procedure of Anfinsen and Haber (1961); its allergenic activity and antigenicity were maintained after reduction and alkylation by iodoacetamide. Apparently the randomly folded material recovered most of its native conformation by spontaneous reoxidation through dialysis against water, for the molecular immunopotency, ultraviolet spectral profiles, and electrophoretic characteristics were recovered. These results suggest that the allergenic activity of DS22, the major allergen in cod, depends on the sequence of certain amino-acid residues rather than on the stereochemical configuration of the protein molecules. Hypothetically, then, this type of molecule can probably penetrate the mucosal barrier of the allergic individual without losing its allergenic immunodominance.
[5 figures, 17 references] LB

8.53 (1.19)(0.4) LIPID OF RUVETTUS PRETIOSUS. II. COMPOSITION OF THE UNSAPONIFIABLE MATTERS AND THE PURGATIVE ACTION OF THE OILS ON MICE

Sato, Yosikazu, and Yasuhiko Tsuchiya (Fac. Agric., Tohoku Univ., Sendai, Japan)
Chemical Abstracts 75, No. 3, 18340u (July 19, 1971)

9.16 (9.19) RESEARCH PROJECT APPEARS TO HOLD SPECIAL PROMISE FOR TOWNS, FISHING

Palmer, H. V. R., Jr.
National Fisherman 52, No. 5, 20A, 24A (September 1971)

A project underway at the Woods Hole Oceanographic Institution on Cape Cod could provide a vastly simplified, effective method of disposing of sewage from coastal towns while, at the same time, providing a truly practical aquaculture system. Project research is based on the premise that treated sewage can be used as fertilizer if it has not been polluted by toxic industrial wastes.

The aquaculture-sewage treatment system involves two farms. The first farm contains treated sewage which phytoplankton use as food. By consuming such chemicals as ammonium, nitrate, and phosphate, these microscopic diatoms provide a third-stage treatment of the sewage effluent. The second farm contains oysters and possibly other shellfish. They completely dispose of the algae, which have served their purpose of cleaning up the water, right on the premises, eliminating a problem that has long plagued other sewage-treatment systems that have relied on algae to cleanse sewage effluent. Experiments during this research have shown that a single oyster can pump about 450 quarts of water a day, consuming nearly all the nourishment the water contains with each gulp. When three or four barriers of oysters are placed in a stream of algae-bearing water, the oysters upstream will fatten; those downstream will starve. Thus a barrier of oysters can be judiciously spaced to filter out all the algae as the water passes by.

Although the feasibility of the aquaculture-sewage treatment system has been proved in the laboratory under controlled conditions, several questions remain to to be answered. Will the system work as well in the open environment where temperatures may vary markedly from night to day and from season to season? Will

9.14 A METHOD FOR MEASURING DIGESTIBILITY AND METABOLIZABLE ENERGY OF FISH FEEDS

Smith, R. R. (Bureau of Sport Fisheries and Wildlife, Western Fish Nutrition Laboratory, Hagerman Field Station, Hagerman, Idaho 83332)
Progressive Fish-Culturist 33, No. 3, 132-134 (July 1971)

Digestion trials and nutrient balance studies are used extensively in studying the nutrition of domestic and laboratory animals.

The objectives of the research reported in this paper were (1) to adapt to fish the methods of nutrient balance and digestion trials which have been used with other animals, (2) to determine the metabolizable energy (ME) and digestibility of carbohydrates of varying complexity, and (3) to study the effect of carbohydrates on nitrogen balance.

Although some problems were encountered, the method appeared satisfactory for determining digestibility, ME content, and nutrient balance of feeds for large rainbow trout (250 to 500 grams). Further research is necessary to determine if values found for these fish are applicable to small trout or to closely related species.

The data...indicate that when digestible carbohydrate was available, it was used by the fish for energy and the more positive [N] balances were obtained when diets contained simple carbohydrates.
[1 figure, 1 table, 6 references] Reprinted in part

9.19 (8.42) MERCURY IN WATER OF THE TIDAL THAMES

Smith, J. David, R. A. Nicholson, and P. J. Moore (Institute of Geological Sciences Geochemical Division, 64 Grays Inn Road, London WC1, England)
Nature 232, No. 5310, 393-394 (August 6, 1971)

The authors developed an atomic absorption spectrophotometric method for the determination of traces of mercury and used it to determine the mercury content of the tidal areas of the River Thames. Data were obtained on the total concentration of mercury in the water and on its partition between that dissolved in the water and that adsorbed on suspended particulate matter. The data are summarized in the following table.

Source of Thames River water: Distance from London Bridge	Cl^-	Particulate matter	Mercury		Calculated level of mercury in particulate matter
			Total	Dissolved	
miles	mg./l.	mg./kg.	µg./kg.	µg./kg.	%
-18.5	39	21.6	0.045	0.006	87
9	3,610	73.1	0.328	0.013	96
11.5	142	66.0	2.85	0.515	82
27	10,030	89.9	0.446	0.009	98
43	16,480	8.2	0.082	0.003	96

9.14 "TEK-FOOD," A PASTEURIZED WHOLE FISH RATION FOR CAPTIVE MARINE MAMMALS

Patashnik, Max, and Paul Kangas (NOAA, National Marine Fisheries Service, Technology Laboratory, Seattle, Wash.)
Laboratory Animal Science 21, No. 3, 406-409 (June 1971)
NOAA Publications Announcement No. 71-14, 17, Item 71-14-16-19 (September 1971)

Our knowledge of the nutrition of marine mammals is limited to the fact that they eat fish. The problems created by feeding raw, iced, or frozen perishable fish of sometimes questionable quality involve (1) possible nutritional inadequacy, (2) inconvenience in handling, and (3) possible hazards from viable parasites, and from pathogenic bacteria introduced by careless handling. To solve these possible problems, we have developed a compact, easy-to-handle, pasteurized, storage-stable food ration from whole fresh fish and seaweed. Owing to its "weinerlike" cohesive texture, it may be cut into convenient subunits for feeding. The product is currently being produced in bulk quantities for field-test evaluation of marine and aquarium facilities in the continental United States and Hawaii. (Author)

9.19 (6.39) ALGICIDES

Fitzgerald, George P. (Water Resources Center, University of Wisconsin, Madison, Wis.) Report on Eutrophication Information Program, Literature Review-2W71-06189, OWRR-W-117-WIS(3), 54 pp. (February 1971). Available from the National Technical Information Service, Operations Division, Springfield, Va. 22151. Order No. PB-198 130, PC$3.00; microfiche 95¢.

Government Research Announcements 71, No. 10, 43 (May 25, 1971)

An evaluation of algicides--what they are, their usage, how they are tested, their efficiency, and methods of application--is presented. Detailed are algicide-test procedures and test media, the importance of algal species and cultures, and pilot-test and field-test evaluation of algicides. Also discussed are effective chemical concentrations required to achieve potentially toxic, but environmentally safe, algal populations. Chemistry of algicides and effects on aquatic organisms are discussed briefly. Algicide problems of water supply reservoirs and recreational lakes, fish ponds, swimming pools, and cooling towers are specifically discussed with suggestions for effective application of toxicants for their control. (MUSIC abstract)

Reprinted

9.19 (8.42)

The study showed that from 82 to 97% of the mercury in the tidal waters of the Thames River is held on suspended particulate matter and that significant amounts of mercury are introduced in sewage effluent. Because dissolved mercury is readily adsorbed onto particulate matter, the effects of mercury on photosynthesis and productivity of phytoplankton may be important. FTP
[1 table, 8 references]

9.16 (9.19) FISH CULTURE IN DOMESTIC WASTE WATER

Anonymous
FAO Aquaculture Bulletin 3, No. 3, 7 (April 1971)

Scientists from the Inland Fisheries Institute at Zabieniec, Poland, are experimenting with the culture of common crucian carp (Carassius carassius) in undiluted, biologically treated, waste water from the town of Kielce. So far they have found that the carp can be grown the year round with no adverse effects on either the fish or the consumers. Fry held in the waste water for at least 10 days gain three times as much weight as fry held in normal ponds; 2-year-old fish gain from six to eight times as much, regardless of retention time. Optimum rate of stocking is higher than in normal ponds--from 25,000 to 35,000 fry and from 2,500 to 3,000 2-year-olds per hectare. Production without feed or chemical treatment has reached 1,317 kg./ha. LB

9.16 (9.19)

Can the plants be made to grow as fast in winter as in summer, and can the oyster's normal wintertime inactivity be overcome? Will other shellfish--hard clams, mussels, and bay scallops--flourish as well as the oysters have done? And can the system be adapted to support salmon, trout, haddock, and lobster? Answers to these questions define some of the areas of continuing research. Meanwhile, fairly firm estimates of the benefits of the system can be made now: A 50-acre algal farm can provide tertiary sewage treatment for a town of 11,000 people and at the same time a harvest of 1,000,000 commercially valuable shellfish a year.

The system being developed will not work in fresh water.
[1 figure] LB

9.16 (1.9) EXPERIMENTS ON INDUCED BREEDING OF THE GREY MULLET, MUGIL CEPHALUS LINNAEUS

Liao, I. C., and Y. J. Lu (Tungkang Marine Laboratory, Taiwan Fisheries Research Institute), T. L. Huang (Tainan Fish Culture Station, TFRI), and M. C. Lin (Taiwan Fisheries Bureau)
Aquiculture 1, No. 3, 15-34 (June 1971) (In Chinese)

The report has 54 figures, 3 tables, and 6 references. LB

8.8 (7.874) (3.2493) CORRELATION BETWEEN TASTE AND CONTENT OF MALONIC DIALDEHYDE IN STORED FROZEN FILLETS OF SOLE AND COD

Perna, A., and F. Perricone (Istituto Sperimentale per l'Igiene ed il controllo Vet. della Pesca, Pescara, Italy)
Atti della Societa Italiana delle Scienze Veterinarie 23, 795-800 (1969)
Food Science and Technology Abstracts 3, No. 3, 3R105, 501 (March 1971)

Batches of frozen fillets of cod, dab sole, and Canadian sole were stored either at -30° C. and 90% relative humidity (R.H.) for 15 mo. or at -18° C. and 85% R.H. for 6 mo. Every 3 mo., samples were removed from storage, their malonic dialdehyde content was determined, and they were boiled and tasted. Although there were differences between the three types of fish, the taste of each correlated with the content of malonic dialdehyde. [2 references] Extractor: LB

9.16 METHOD OF LONG-TERM RETENTION OF ANTIBIOTICS IN FISH ORGANISM

Vladimirov, V. L. (U.S.S.R.)
Chemical Abstracts 74, No. 21, 108746q (May 24, 1971)

9.2 RESOURCE ALLOCATION FOR R&D PROJECTS IN DEVELOPING COUNTRIES

Adke, S. S., J. V. Rajan, and S. K. Subramanian (National Chemical Laboratory, Poona, India)
IEEE Transactions on Engineering Management 18, No. 1, 17-25 (February 1971)

This study was carried out because of the need for a ready method to precompute the economical range of expenditure to be incurred on any R&D project to be undertaken by a research institution having no direct participation in the commercialization of the technology it develops. A nomogram is presented for quickly precomputing the economic range of expenditure on a project before its actual initiation. The proposed technique is evaluated by comparing the results obtained from the nomogram in a study of 15 completed R&D projects.
[2 figures, 2 tables, 22 references] FTP

9.3 JURISDICTION--TERRITORIAL WATERS--ARCTIC WATERS
(9.19) POLLUTION PREVENTION ACT EXTENDS LIMITED CANADIAN JURISDICTION OVER NORTHWEST PASSAGE

Anonymous
Vanderbilt International 4, No. 1, 67-82 (Winter 1970)

This article comments on the Canadian Pollution Prevention Act [Arctic Waters Pollution Prevention Act, 18-19 Eliz. 2, C.27 (Can. 1970), reprinted in 9 Int'l Legal Materials 543 (1970)] and the Law of the Sea.
[90 footnotes] FTP

9.3 WET WAR -- NORTH PACIFIC

Oliver, Edward F. (Merchant Vessel Personnel Division, U.S. Coast Guard Headquarters)
San Diego Law Review 8, No. 3, 621-638 (May 1971)

In this article the author discusses: The United States Contiguous Fishery Zone (Basis for establishment, Evolution of regime of contiguous fishery zones); North Pacific Fisheries Treaties; Record of Vessels Seized and Disposition (Violation of the contiguous fishery zone, Violation of high-seas treaty areas); Legal Aspects Involved With Seizure of Foreign Vessels (Innocent passage, Hot pursuit, Force majeure, Constructive presence); Proof of Prosecution (Description of vessel, Geographical position, Treaty violations); and Conclusions.
[51 footnotes] FTP

9.3 (9.4) POLLUTION IN PERSPECTIVE: A SURVEY OF THE FEDERAL EFFORT AND THE CASE APPROACH

Schroeder, Stanley W. (Lee, Toomey & Kent, Washington, D.C.)
Natural Resources Lawyer 4, No. 2, 381-428 (April 1971) (Journal of the Section of Natural Resources Law of the American Bar Association)

This paper is an overview of the pollution field dealing with (1) a review of the historical development of major federal legislation relative to air, water, and solid waste pollution; (2) a review of congressional authorizations and appropriations for pollution control; (3) identification of some of the principal battlegrounds in the case law; (4) a discussion of the current status of pollution control efforts; and (5) a summary of pervasive issues still outstanding.
[124 footnotes] FTP

9.3 (9.2) A SELECTED BIBLIOGRAPHY ON PUBLIC ENVIRONMENTAL POLICY AND ADMINISTRATION

Hennig, Daniel H. (University of New Mexico School of Law, Albuquerque, N. Mex.)
Natural Resources Journal 11, No. 1, 205-219 (January 1971)

This bibliography contains a list of selected references to books, articles, and government reports of value in acquainting the student, instructor, official, and citizen with some of the literature available in Public Environmental Policy and Administration and Related Areas. It contains references to 100 books, 199 articles, and 81 government reports. FTP

9.6 EL SEXTANTE

Schembri Maina, Antonio (director)
Published by Euroamericana de Publicaciones, Calle 57 No. 7-51, Apartado Aéreo No. 65-30, Bogotá, Colombia, South America (In Spanish)

This bimonthly journal is published in the interest of the maritime activities of the Bolivarian nations (Colombia, Ecuador, Panama, Peru, Venezuela, and Bolivia) and of the Central American and Caribbean countries. It is concerned with the progress and expansion of the Latin American countries in the oceans--their merchant marine capabilities, shipyards, river fleets and fisheries, ports and harbors, commercial fishing industries, and oceanographic research activities. Its stated goal is "the increase of the 'Maritime Conscience' in the South American republics." It costs 60¢ a copy, 80¢ for back issues. LB

9.3 (9.19) INTERNATIONAL ENVIRONMENTAL DAMAGE CONTROL: SOME PROPOSALS FOR THE SECOND BEST OF ALL POSSIBLE WORLDS

Vasek, Stephen J. (University of Kentucky)
Kentucky Law Journal 59, No. 3, 673-718 (1970-71)

In this article the author discusses some major causes of international pollution in order to provide a framework for the legal analysis of specific pollution events, to evaluate the probable effectiveness of the existing international system in preventing further environmental damage, and to suggest some beneficial changes in that system. [160 footnotes] FTP

9.3 U.S. DRAFT ARTICLES ON TERRITORIAL SEA, STRAITS, AND FISHERIES SUBMITTED TO U.N. SEABEDS COMMITTEE

Stevenson, John R. (Department of State and U.S. Representative to the committee)
Department of State Bulletin 65, No. 1680, 261-268 (September 6, 1971)

The U.N. Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction met at Geneva July 19-August 27. This paper is a statement by John R. Stevenson, Legal Adviser of the Department of State and U.S. Representative to the committee, made in Subcommittee II on August 3, together with the texts of U.S. draft articles submitted to the subcommittee that day.

Subject	Page	Code
ANALYSIS, GENERAL		
A Biodegradability Test for Insecticides	19	7.49
Model Ecosystem for the Evaluation of Pesticide Biodegradability and Ecological Magnification	19	7.49
Some Factors Affecting the Biological Availability of Amino Acids in Fish Protein	19	7.52
Estimating the Metabolizable Energy of Foodstuffs With an Avian Model	21	7.9
Dielectric Measurements in Food Analysis	22	7.84
Freezing Specimens (pat.)	22	7.9
ANALYSIS, INORGANIC		
Determination of Copper, Iron, and Zinc From a Single Small Sample	17	7.42
Rapid Determination of Mercury in Fish	17	7.42
Gas Chromatographic Determination of Organic Mercury Compounds by Emission Spectrometry in a Helium Plasma. Application to the Analysis of Methylmercuric Salts in Fish	17	7.45
Radiochromatographic Assay for Thiol Groups of Soluble Proteins Using Mercury-203 Labeled Methylmercury	17	7.45
Combined Gas Chromatography-Mass Spectrometry of Multiple Chlorinated Pesticide Residues in Foods	17	7.461
A Simplified Method for Determining Nitrates in Food	18	7.45
Collaborative Study of a Method for Multiple Chlorinated Pesticide Residues in Fish	18	7.461
Collaborative Study of the Use of a Convenient Salt Measuring Titrator for Monitoring Salt Concentration in Meat, Fish, and Cheese	18	7.461
ANALYSIS, ORGANIC		
Reaction of α,α'-Diphenyl-8-Picrylhydrazyl With Olefinic Fats. 2. Model Studies on the Determination of Spoilage Capacity of Olefinic Fatty Substrates	11	4.11
AUTHOR INDEX	28	
BACTERIOLOGY		
Studies on the Interdependence of the Selected Psychrophylic Bacteria Strains and Their Activity on Salmonella and Escherichia Groups	2	0.5
The Effect of Oxygen on the Germination and Outgrowth of Spores of Clostridium butyricum	3	0.5
The Isolation and Differentiation of Pseudomonads From Foods	3	0.5
Removal of Mercury Compounds by Mercury-Resistant Microorganisms. III. Vaporization of Mercury by a Microorganism	4	0.5
Comparative Efficiency of Two Methods and Two Plating Media for Isolation of Staphylococcus aureus From Foods	21	7.86
Comparative Examinations for the Effectiveness of Media To Detect Clostridia From Canned Meat Products	22	7.86
BOOKS AND JOURNALS		
El Sextante	25	9.6
BYPRODUCTS		
The Use of Lignonsulphonate Binders in Pelleting	13	6.
Search for Methods for Removing Urea From Shark Meat	16	6.59
CANNED FISH, GENERAL		
The Canned Fish Industry in Poland	10	3.3
CANNED FISH, PROCESSING		
Heat Penetration Into Rectangular Food Containers	9	3.336
Methods for the Elimination of Carbamide From Shark Meat	9	3.336
Bacterial Decontamination by Electrophoresis of Aqueous Cooking Salt Colouring Baths for Industrial Preparation of Sea-Salmon Products	10	3.336
Changes in the Salt Content and Acidity of Stored Tinned Fish in Tomato Juice	10	3.336
Absorption Spectra of Raw Brines	11	3.336
Free Amino Acids in Canned Fish	12	3.337
Primary Treatment of Waste Water From Salmon Canning Plants	12	3.337
CHEMISTRY AND BIOCHEMISTRY		
Fat Cell Size and Lipid Metabolism	1	0.36
GEAR, FISHING		
Gillnet Selectivity on Sockeye (Oncorhynchus nerka) and Pink Salmon (O. gorbuscha) of the Skeena River System, British Columbia	5	2.1126
The Production of Threadfin Shad as Live Bait for Hawaii's Skipjack Tuna Fishery: An Economic Feasibility Study	6	2.1127
HANDLING FRESH FISH		
Effects of Washing Freshwater Fish on Keeping Quality	7	2.3
Method and Apparatus for Removing Meat From the Shells of Bivalve Mollusks (pat.)	7	2.3
Method for Shucking and Eviscerating Bivalve Mollusks (pat.)	7	2.3
Catfish Leaflet	8	2.3
Development of Improved Techniques for Shucking Pacific Oysters	8	2.3
Method for Shucking Shell Fish (pat.)	8	2.3
A Prawn Sorting Machine (pat.)	10	2.3
MARINE PLANT PRODUCTS		
The Sea as a Food Supplier	15	6.37
Industrial Extraction of Mannitol From Phaeophyceae	15	6.39
NUTRITION AND MEDICINE, GENERAL		
Food and Safety	1	0.4
Zinc Retention in Young Rats Fed Increasing Levels of High-Zinc Oysters	3	0.7
Nutrition and Man's Intellect and Behavior	4	0.7
NUTRITIONAL VALUE OF FISHERY BYPRODUCTS OTHER THAN MEAL		
Mercury in Selected Protein Concentrates	15	6.54
The Calcium Requirements of Laying Hens and Effects of Dietary Oyster Shell Upon Egg Shell Quality	15	6.55
Digestion of Concentrates in Sheep. 2. The Effect of Urea or Fish-Meal Supplementation of Barley Diets on the Apparent Digestion of Protein, Fat, Starch and Ash in the Rumen, the Small Intestine and the Large Intestine, and Calculation of Volatile Fatty Acid Production	16	6.55
OILS, CHEMICAL AND PHYSICAL PROPERTIES		
Chromatography of Unusual Lipids on Thin Layers of Magnesium Oxide	11	4.11
OILS, NUTRITION		
Evidence for Nonessentiality of Linolenic Acid in the Diet of the Rat	12	4.91
Acute and Sub-Acute Toxicity of UV Irradiated Oil for Mice	12	4.92
Carcass Composition of Chickens Fed Carbohydrate-Free Diets Containing Various Lipid Energy Sources	13	4.92
PACKAGING		
New Tools for the Packing of Klipfish, Stockfish, Salted, and Frozen Fish	10	3.2386
POLLUTION		
Levels of Organochlorine Pesticides and Polychlorinated Biphenyls in Fish Caught in Swedish Water Areas or Kept for Sale in Sweden, 1967-1970	21	8.42
Mercury in Water of the Tidal Thames	23	9.19
Algicides	24	9.19
PRESERVED FISH, MISCELLANEOUS		
Artificial Ripening of Maatjes-Cured Herring With the Aid of Proteolytic Enzyme Preparations	12	3.9
Chemical Preservation of Fish and Waste of Fish Under Tropical Conditions	12	3.9
QUALITY CONTROL		
Muscle Protein in Meat Products	18	7.51
Collaborative Study of a Method for Determining the Fish Flesh Content of Frozen Breaded Fish Products	19	7.80
Evaluation of the Fitness for Consumption of Fish and Some Fish Products	20	7.8
Techniques in the Sensory Analysis of Flavours	20	7.8
Pepsin Digestibility Method for Animal Proteins	20	7.80
Biochemical Basis of Fish Freshness	21	7.80
Adenosinetriphosphate (ATP) Levels in Foods Contaminated by Bacteria	21	7.85

CHEMISTRY AND BIOCHEMISTRY--Continued
- Comparision of the Amino Terminal Sequences of Bovine, Dogfish, and Lungfish Trypsinogens — 1 — 0.38
- Sensitivity of Fish ATPases to Polychlorinated Biphenyls — 1 — 0.38
- Investigations on Enzymes in Fish.
  - I. Enzyme-Activity in Dependence of pH, Temperature and Water Composition — 1 — 0.38
  - II. Trypsin- and α-Amylase Inhibitors — 2 — 0.38
- The Zymogen of Tadpole Collagenase — 2 — 0.38

COMPOSITION, ORGANIC
- Characterization of a Major Allergen (Cod). Observations on Effect of Denaturation on the Allergenic Activity — 23 — 8.51
- Lipid of Ruvettus pretiosus. II. Composition of the Unsaponifiable Matters and the Purgative Action of the Oils on Mice — 23 — 8.53

DATA SYSTEMS
- A Digital Computer Program for the Statistical Analysis of Heat Resistance Data Applied to Bacillus stearothermophilus Spores — 4 — 0.9

ECONOMICS AND STATISTICS
- Resource Allocation for R&D Projects in Developing Countries — 25 — 9.2

EQUIPMENT, PLANT
- Method and Apparatus for Eviscerating Shellfish (pat.) — 7 — 2.3
- Apparatus for Producing Mixed Subdivided Food Material (pat.) — 9 — 3.231
- A New Machine for Coating Fish With Flour — 9 — 3.231
- Mechanization of Cold Smoking of Fish — 12 — 3.4

FISH CULTURE
- A Method for Measuring Digestibility and Metabolizable Energy of Fish Feeds — 23 — 9.14
- Research Project Appears To Hold Special Promise for Towns, Fishing — 23 — 9.16
- "Tek-Food," A Pasteurized Whole Fish Ration for Captive Marine Mammals — 24 — 9.14
- Experiments on Induced Breeding of the Grey Mullet, Mugil cephalus Linnaeus — 24 — 9.16
- Fish Culture in Domestic Waste Water — 24 — 9.16
- Method of Long-Term Retention of Antibiotics in Fish Organism — 24 — 9.16

FISH MEAL, NUTRITIVE VALUE
- Dogfish Meals as Supplements for Poultry Rations — 13 — 6.190
- The Effects of Fish Meal, Methionine and Different Cereal Grains in Diets of Young Turkeys — 13 — 6.190
- The Availability of Amino Acids in Fish Meals — 14 — 6.195
- Effects of Zinc Bacitracin, Dried Bakery Product and Different Fish Meals in Diets of Young Turkeys — 14 — 6.195
- Performance of Commercial Broiler Genotypes on Fish Meal Diets With a Charcoal Supplement — 15 — 6.195
- Urea Tolerance in Growing and Adult Chickens — 16 — 6.199

FISH MEAL AND OIL, MANUFACTURE
- Recent Advances in the Fish By-Products Industry — 14 — 6.10
- Anaerobic Treatment of Alewife-Processing Wastes — 14 — 6.130

FOOD TECHNOLOGY
- Fact and Fancy in Nutrition and Food Science — 3 — 0.6
- Fish — 3 — 0.6
- Polyphosphate Treatment of Fish — 3 — 0.6
- Industrial Microscopy — 4 — 0.6
- Single Cell Protein and the Exploitation of Mutant Algae Lacking Cell Walls — 4 — 0.6
- Soybeans as a Food Source — 4 — 0.6

FROZEN FISH, CHANGES IN DURING COLD STORAGE
- Moisture Content and Shelflife. (Part 2, Conclusion) — 9 — 2.43

FROZEN FISH, PROCESSING
- Blue Crab Meat
  - I. Preservation by Freezing — 9 — 3.234
  - II. Effect of Chemical Treatments on Acceptability — 10 — 3.234

QUALITY CONTROL--Continued
- Collaborative Study of a Method for the Determination of Trimethylamine Nitrogen in Fish — 21 — 7.879
- Adaptability of Chemical-Analytical Methods for the Quality Assessment of Frozen Fish — 22 — 7.80
- A Comparator Method of Assessing Bacterial Plate Counts — 22 — 7.85
- Evaluating the Quality of Frozen Fish According to the Contents of Volatile Carbonyl Compounds — 22 — 7.89
- Correlation Between Taste and Content of Malonic Dialdehyde in Stored Frozen Fillets of Sole and Cod — 24 — 8.8

REGULATION AND INSPECTION
- International Environmental Damage Control: Some Proposals for the Second Best of All Possible Worlds — 25 — 9.3
- Jurisdiction--Territorial Waters--Arctic Waters Pollution Prevention Act Extends Limited Canadian Jurisdiction Over Northwest Passage — 25 — 9.3
- Pollution in Perspective: A Survey of the Federal Effort and the Case Approach — 25 — 9.3
- A Selected Bibliography on Public Environmental Policy and Administration — 25 — 9.3
- U.S. Draft Articles on Territorial Sea, Straits, and Fisheries Submitted to U.N. Seabeds Committee — 25 — 9.3
- Wet War -- North Pacific — 25 — 9.3

RESOURCE ASSESSMENT
- Manual of Methods for Fisheries Resource Survey and Appraisal. Part 1. Survey and Charting of Fisheries Resources — 5 — 2.12

SAFETY AT SEA
- Reliable Bilge Alarm Can Be Built for Peanuts — 7 — 2.119
- Guide to Use of Sea Anchors — 8 — 2.119

SALT FISH
- The Production of Dried Fillets From Cartilaginous Ocean Fish — 11 — 3.5

SHRIMP
- The Australian Prawns Industry. II. Quality Aspects for Export Prawns — 5 — 1.85

SMOKED FISH
- Food Smoking Process (pat.) — 11 — 3.4
- Line for Cold-Curing Fish (pat.) — 11 — 3.4
- Meat Smoking Apparatus (pat.) — 11 — 3.4
- Polycyclic Aromatic Hydrocarbons in Smoked Fish, Katsuobushi — 11 — 3.4
- Smoke Aromas in the Fish Industry — 12 — 3.4

SPOILAGE
- Inosine Monophosphate (IMP) and Hypoxanthine Formation in Three Species of Shrimp Held on Ice — 5 — 2.08
- Variations in Quality and Shelf-Life of "Fresh" Fish and Air-Thawed "Chilled" Fish — 6 — 2.00

TUNA
- Status of Tuna Fisheries Resources in the Atlantic Ocean — 5 — 1.120

VESSELS, FISHING
- Separating Apparatus (pat.) — 6 — 2.114

WHALES AND OTHER MARINE MAMMALS
- Fur Seal Investigations, 1969 — 6 — 1.951

Author	Page	Code
Aas, K.	23	8.51
Adigamov, K. Kh.	11	3.4
Adke, S. S.	25	9.2
Aitken, J. R.	15	6.195
Alles, L. A. C.	9	3.336
Allhands, Frank H., Jr.	19	7.80
Altuf'eva, K. A.	22	7.89
Alverson, D. L. (ed.)	5	2.12
Anisimov, A. P.	11	3.4
Bache, Carl A.	17	7.42
--	17	7.45
Baer, Edward F.	21	7.86
Baidikov, B. A.	11	3.4
Barnes, Richard H.	4	0.7
Barry, Thomas L.	17	7.461
Beasley, Thomas M.	15	6.54
Bellman, Sander W.	17	7.461
Belonje, B.	3	0.7
Biely, Jacob	13	6.190
--	16	6.199
Bloch, Kurt J.	2	0.38
Boland, Frederick E.	21	7.879
Borchardt, Jack A.	14	6.130
Caraes, Anne	15	6.39
Carpenter, K. J.	14	6.195
Carr, Richard L.	18	7.461
Chang, Yung Cheng	6	2.1127
Cheprasov, N. N.	11	3.4
Christie, E. M.	5	1.85
Claggett, F. G.	12	3.337
--	13	6.190
Cowan, J. C.	4	0.6
Cowell, N. D.	9	3.336
Craddock, V. M. (rev.)	1	0.4
Cullen, M. C.	17	7.45
Cutkomp, L. K.	1	0.38
Davies, D. Roy	4	0.6
Desaiah, D.	1	0.38
Deshmukh, D. S.	3	0.7
Dittmann, B.	12	3.9
Dominova, S. P.	10	3.336
Edwards, Hardy M., Jr.	13	4.92
Eichner, E. [K.]	9	2.43
Elsayed, S.	23	8.51
Engeseth, Egon M.	10	3.2386
Fessman, G. (pat.)	11	3.4
Filatov, A. I.	11	3.4
Fitz, Norman	19	7.52
Fitzgerald, George P.	24	9.19
Fraser, C.	16	6.55
Free, Alfred H.	18	7.461
Friedrich, W.	13	6.
Frolovich, E. I.	11	3.4
Garcia-Tello, Patricio	2	0.5
Gehrt, Albert J.	20	7.80
Gillespie, D. C.	7	2.3
Gordon, A.	3	0.6
Gorton, T. S., Jr.	6	2.114
--	7	2.3
Grachev, S. L.	11	3.4
Grieb, William C., Jr. (pat.)	7	2.3
Gross, Jerome	2	0.38
Grussendorf, O. W.	19	7.49
Gureeva, R. T.	11	3.4
Halvorson, Harvest	19	7.49
Hambleton, R.	3	0.5
Hanks, Fletcher, Jr. (pat.)	7	2.3
Hardy, Roy	3	0.6
Harper, Elvin	2	0.38
Hart, Paul	13	4.92
Hayasi, Sigeiti	5	1.120
Heiss, R.	9	2.43
Henning, Daniel H.	25	9.3
Henning, W.	12	3.4
Hermodson, Mark A.	1	0.38
Hincenbergs, I.	12	4.91
Hobbs, Geoffrey	3	0.6
Holloway, P. T. (pat.)	11	3.4
Howes, C. E.	13	6.190
Huang, T. L.	24	9.16
Hull, S. J.	15	6.55
Ishaque, M.	19	7.49
Iversen, Robert T. B.	6	2.1127
Jackson, A. K.	21	7.85
Jukes, Thomas H.	3	0.6
Kangas, Paul	24	9.14
Kanzaki, Fusae	4	0.5
Kapoor, Inder P.	19	7.49
Kaufmann, H. P.	11	4.11
Kelly, M.	14	6.195
Kibby, M. R.	4	0.9
Kielwein, G.	3	0.5
King, Frederick J.	9	3.234
Koch, R. B.	1	0.38
Kohn, R. M.	22	7.84
Korringa, P.	15	6.37
Koto, Tsutomu	5	1.120
Kume, Susumu	5	1.120
Kuratsune, Masanori	11	3.4
Kuznetsova, L. A.	10	3.336
Lamoreux, W. F.	15	6.195
Langner, H. J.	18	7.51
Lapshin, I. I.	12	3.337
Larkin, P. A.	5	2.1126
Ledovskikh, A. T.	11	3.4
Leighton, A. T., Jr.	13	6.190
Lennon, Jean S.	9	3.234
Liao, I. C.	24	9.16
Lin, M. C.	24	9.16
Linow, Fritz	11	4.11
Lisk, Donald J.	17	7.42
--	17	7.45
Lu, Y. J.	24	9.16
Lyman, R. L.	12	4.91
Lyne, F. A.	4	0.6
Mackin, Robert F.	7	2.3
Maeda, Kazuko	4	0.5
Mangold, H. K.	11	4.11
March, B. E.	13	6.190
--	16	6.199
Markmann, H.	12	3.9
Markowski, B. J.	10	3.3
Masuda, Yoshito	11	3.4
McDonald, I.	16	6.55
McGuinness, E. T.	17	7.45
McKone, Colin	17	7.42
Meade, Thomas L.	14	6.10
Meranger, J. C.	3	0.7
Metcalf, Robert L.	19	7.49
Miller, David	19	7.52
Miura, Toshiyuki	12	4.92
Miyaki, Komei	12	4.92
Montgomery, W. A.	5	1.85
Moore, P. J.	23	9.19
Morita, Yasuo	5	1.120
Moss, G. E.	4	0.6
Muenkner, W.	22	7.80
Mukherjee, K. D.	11	4.11
Mullenhoff, P. A.	15	6.55
Murphy, R. P.	22	7.85
Muto, Takashi	12	4.92
Nakagami, Terutaka	4	0.5
Navani, S. K.	4	0.9
Nelson, Richard W.	7	2.3
Neurath, Hans	1	0.38
Nicholson, R. A.	23	9.19
Noren, Koidu	21	8.42
Oliver, Edward F.	25	9.3
Ostovar, Kurosh	7	2.3
Paige, Dorothy D.	21	7.879
Palmer, H. V. R., Jr.	23	9.16
Patashnik, Max	24	9.14
Perna, A.	24	8.8
Perricone, F.	24	8.8
Podsevalov, V. N.	11	3.4
Pohl, Joachim	11	4.11
Pohland, Fred G.	14	6.130
Potter, L. M.	13	6.190
--	14	6.195
Proudfoot, F. G.	15	6.195
Rajan, J. V.	25	9.2
Rakow, D.	6	2.00
Reeck, Gerald R.	1	0.38
Reichenbach-Klinke, H.-H.	1	0.38
--	2	0.38
Reichenbach-Klinke, K.-E.	2	0.38
Rigby, G. J.	3	0.5
Ritskes, T. M.	12	3.9
Robohn, Karl F.	13	6.
Rodina, T. G.	12	3.337
Roe, Francis (ed.)	1	0.4
Rozmysł, Eugeniusz	2	0.5
Rzhepishevskii, P. M.	11	3.336
Sanders, Marion	19	7.52
Sangha, Gurcharan K.	19	7.49
Sato, Yosikazu	23	8.53
Schembri Maina, Antonio (dir.)	25	9.6
Scholefield, J.	4	0.9
Schroeder, Stanley W.	25	9.3
Scott, M. L.	15	6.55
Shah, B. G.	3	0.7
Sharpe, A. N.	21	7.85
Shcherbakov, V. A.	11	3.4
Shelton, J. R.	14	6.195
Shingu, Chiomi	5	1.120
Sidhu, G. S.	5	1.85
Skachkov, V. P.	9	3.336
--	11	3.5
--	16	6.59
Smith, J. David	23	9.19
Smith, John D.	8	2.3
Smith, R. R.	23	9.14
Soares, Joseph H., Jr.	19	7.52
Sokolova, O. M.	22	7.89
Solomon, J.	19	7.49
Spencer, H. W.	20	7.8
Spinelli, John	21	7.80
Squibb, Robert L.	21	7.9
Stevenson, John R.	25	9.3
Stone, Frederick E.	5	2.08
Strasser, Jurgen H.	9	3.234
Subramanian, S. K.	25	9.2
Swift, J. R. (pat.)	11	3.4
Takacs, J.	22	7.86
Tardio, Joseph L.	21	7.86
Tarr, H. L. A.	13	6.190
Tinoco, J.	12	4.91
Tkachenko, G. P.	11	3.4
Todd, Ian St. P.	5	2.1126
Tonomura, Kenzo	4	0.5
Tretsven, Wayne I.	7	2.3
Tsuchida, Masako	12	4.92
Tsuchiya, Yasuhiko	23	8.53
Tucker, C. G.	22	7.85
Tye, Ross W.	1	0.38
Ushkalova, V. N.	22	7.89
Vander Werf, Loren J.	18	7.461
Vasek, Stephen J.	25	9.3
Vladimirov, V. L.	24	9.16
Volodchenko, I. L.	12	3.4
Walsh, Kenneth A.	1	0.38
Watkins, Ruth	17	7.42
Weinberg, V. M.	11	3.4
Weiner, Lawrence M.	17	7.42
Wenstrom, R. T.	6	2.114
--	7	2.3
Werren, John C.	19	7.80
Westcott, C. C.	18	7.45
Westoo, Gunnel	21	8.42
Wierzchowski, Jozef	20	7.8
Williams, M. A.	12	4.91
Wittfogel, H.	10	3.336
Wolf, W. J.	4	0.6
Wong, J.	12	3.337
Woodrow, M. N.	21	7.85
Yap, H. H.	1	0.38
Zabiakin, V. P.	11	3.4
Zak, Bennie	17	7.42
Zaleski, Stanisław	2	0.5
Zhernakova, G. V.	9	3.231
Ørskov, E. R.	16	6.55

USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED BY THE DIRECTOR OF THE BUREAU OF THE BUDGET APRIL 18, 1968.

COMMERCIAL FISHERIES ABSTRACTS

Editorial Staff

Frank T. Piskur ..... Editor
Lena Baldwin ..... Associate Editor
Gladys K. Chandler ..... Editorial Assistant

COMMERCIAL FISHERIES ABSTRACTS is available to members of the fishing industry and allied interests. Requests for instatement on the mailing list should be addressed to

National Marine Fisheries Service
Scientific Publications Staff
Bldg. 67, Naval Support Activity
Seattle, Washington 98115.

REPRINTS of articles or other material from which abstracts are drawn should be requested either from the author or from the publishing outlet. Addresses of these outlets are printed in *Commercial Fisheries Abstracts* about once a year.

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

GPO 999-864

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SCIENTIFIC PUBLICATIONS STAFF
BLDG. 67, NAVAL SUPPORT ACTIVITY
SEATTLE, WASHINGTON 98115

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

U.S.MAIL